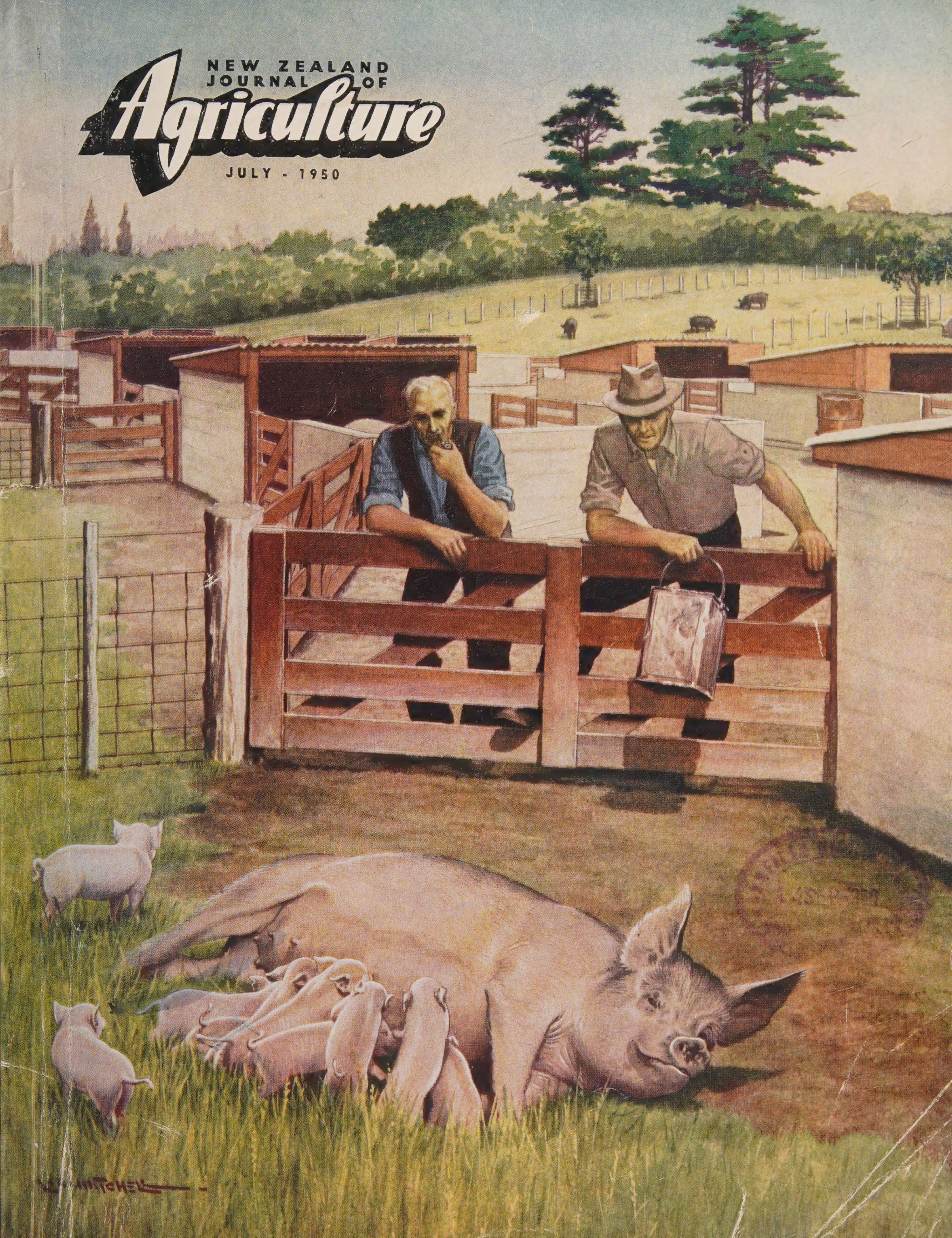
NEW ZEALAND JOURNAL OF Agriculture

JULY - 1950



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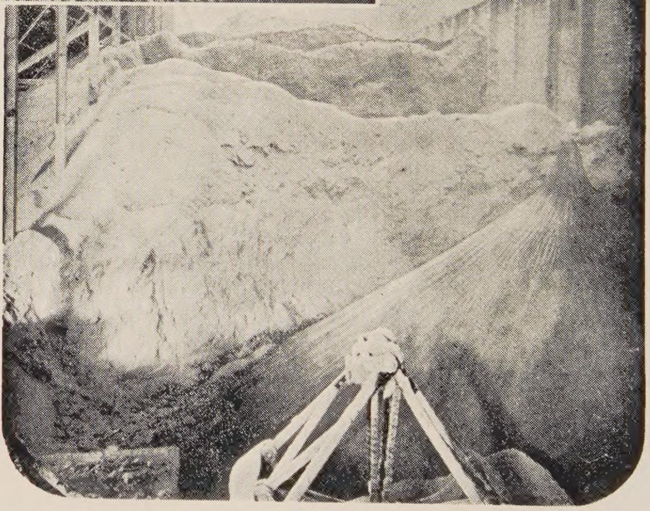

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THE NORTH ISLAND SUPERPHOSPHATE MANUFACTURERS

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NEW ZEALAND JOURNAL OF Agriculture

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This month's cover

Pig production on an extensive scale in New Zealand began with the introduction of home separation on dairy farms. For many years the methods of handling pigs were haphazard and pigs were looked upon simply as a means of using up surplus food, mainly dairy by-products, but as farmers began to realise that excellent returns could be derived from efficient pig keeping, management methods improved vastly. This month's cover, which was painted by L. C. Mitchell, shows portion of a modern layout in which houses are of permanent material and where good grazing is available for the pigs.

TABLE OF CONTENTS

Premium Approved for Porker-weight Pigs	..	3
Care of Livestock during August	..	4
Design and Construction of Sheep-drafting Yards	J. E. Duncan	5
Identical Twin Calves for Research	..	11
Reducing Production Costs in Citrus Orchards	P. Everett	13
The Forage Harvester	C. J. Crosbie	16
Vaccination of Sheep against Scabby Mouth	J. J. G. Peddie	19
Primary Production Monthly Review	..	20
Potash Deficiency in Land in Rotorua District	C. R. Taylor	21
Meteorological Records for May	..	22
Premium on Porkers	A. Longwill	23
Dairy Produce Graded for Export	..	26
Mechanical Aids to Irrigation	W. A. Lunn	27
Skimmed-milk Disposal from Small Farm Dairies	E. Sigley	31
Cereals for Greenfeed	C. P. Whatman	33
A Mechanical Sprayer Operated by One Man	R. K. Johnson	39
Radio Broadcasts	..	40
History of New Zealand Milking Shorthorns	J. M. Ranstead	41
Household Poultry	W. L. McIver	51
Pasture Seed Crops and Seed-potato Varieties	..	52
The Small Milk-treatment Station	S. J. Cowen	53
The Home Garden	S. O. Gillard	55
Recent Patent Specifications for Farming Inventions	..	64
Small Concrete Feeding Troughs	F. H. Collin	65
Domestic Beekeeping	J. E. Rodie	66
Benefits from Topdressing and Cobalt Application	A. V. Allo	67
The Flower Garden	C. K. Ellis	75
Tea	Nell Macpherson	81
Twin Dolls and Families of Dolls	Dorothy Johnson	84
Using Scotch Tape	Evelyn E. Moore	84
Electric Vacuum Cleaners	Edith G. McNab	85
A Waist Petticoat	Nell Macpherson	89
Effects of Cooking and Preservation on Food Values	Evelyn E. Moore	93

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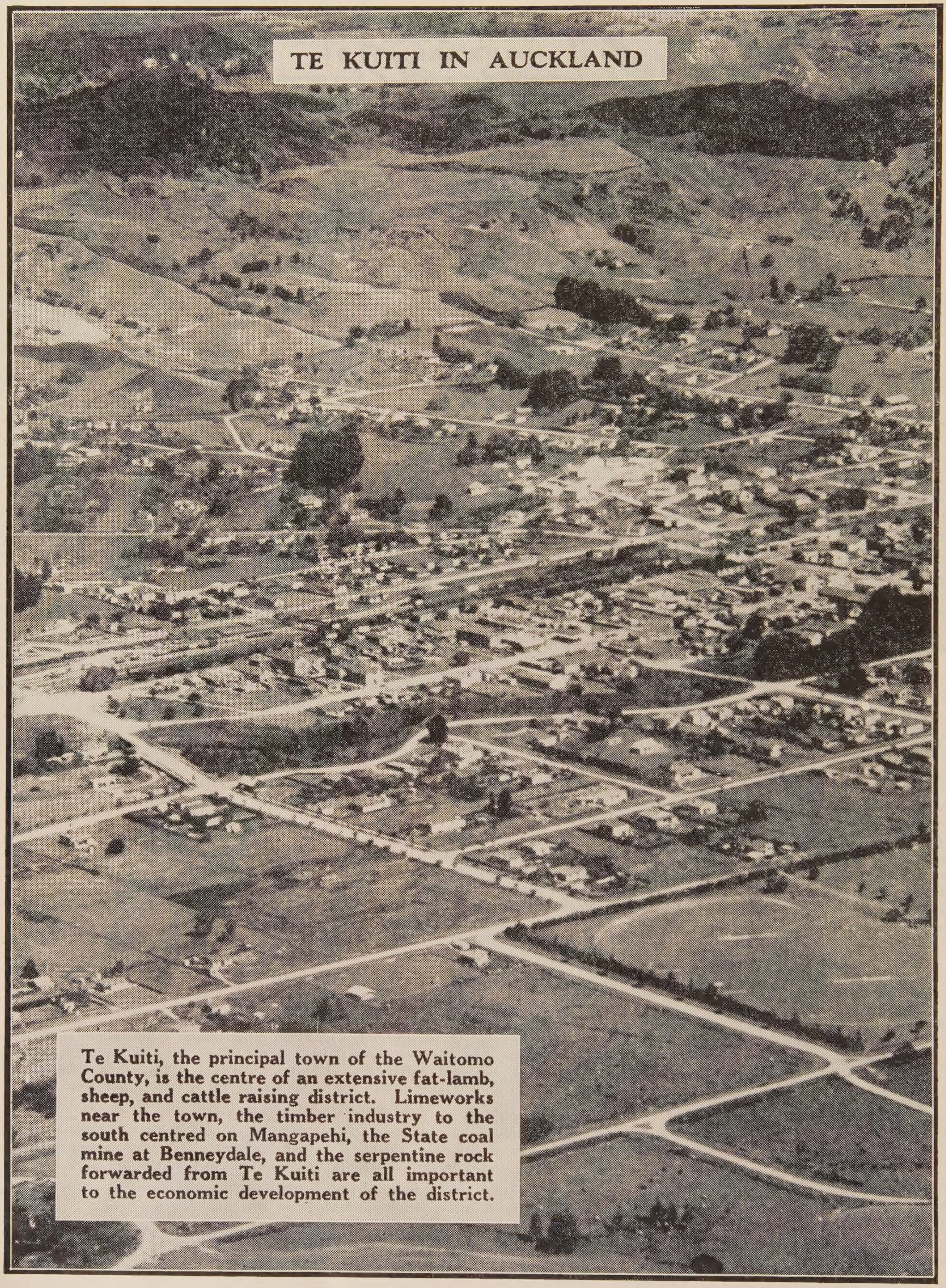
TE KUITI IN AUCKLAND



Te Kuiti, the principal town of the Waitomo County, is the centre of an extensive fat-lamb, sheep, and cattle raising district. Limeworks near the town, the timber industry to the south centred on Mangapehi, the State coal mine at Benneydale, and the serpentine rock forwarded from Te Kuiti are all important to the economic development of the district.

[V. C. Browne photo.

PREMIUM APPROVED FOR PORKER-WEIGHT PIGS

A SERIOUS decline in pig raising and interest in pig production generally took place during the later years of the war, when labour shortage and other factors dictated the necessity of concentrating on the primary job of butterfat production on our dairy farms. Since the end of the war continued labour and material shortages, coupled with changes in the utilisation of dairy by-products, have been responsible for the industry's decline. Increasing liquid milk consumption, drying of skimmed milk and buttermilk, and diversion of increased quantities of whey for lactose extraction have resulted in shorter supplies of basic feeds being available for pig feeding. Moreover, concentrate grains and meals have been scarce and prices in the main pig-producing districts high.

Trend Limiting Production

Though the development of alternative uses of dairy by-products is sound as long as it results in the production of a greater quantity of human food and the market is a remunerative one, this trend does limit pig production which, under New Zealand conditions, is based on the utilisation of surplus dairy by-products. Our economy is such that it is unlikely that our pig production will ever be based on grain feeding as in most overseas countries, and the major development of our pig industry in the last 20 years has occurred in the dairying, as opposed to the grain-producing, areas.

Increase in New Zealand Consumption

Production fell from a total of more than a million pigs a year just before and in the early stages of the war to 646,000 for the 1946-47 meat year. Since then, with returned servicemen taking up farms, there has been a slight recovery, but we are still far from exploiting the possibilities to the full. Even on the reduced basic feed supplies and restricted supplementary feeding, including home-grown winter feed crops, it is estimated that the potential production is still in excess of a million pigs a year and a tonnage as great as ever we have produced in the past.

Our best production under normal conditions was just short of 50,000 tons; it has fallen to 40,000 tons. Meantime our own consumption figures have increased, and our exports of pig meat are now less than a third of our pre-war figure. This in itself constitutes a menace to the security of the dairy farmer if he finds at some stage in the future that he needs a considerable export outlet for pig meat, as a by-product of his butterfat production, to meet his costs of production.

The trend in recent years under the operation of a uniform price schedule per pound irrespective of the weight of the carcass—as long as it was at least 60 and not above 175lb.—has been for pigs to be killed at higher weights. When we were producing a million pigs a year 600,000 were porkers and 400,000 were baconers. Last year we produced considerably more than 400,000 baconers, but porkers had fallen to little more than 200,000 or only a third of pre-war numbers. The position with exports of porkers is even more serious. From 14,000 tons pre-war the figure was down to little more than 2000 tons last year.

Good Name Established in Britain for Porkers

We have built up a very good name in Britain for our porker production. There are better prospects of extending that market than there are of competing on the Wiltshire bacon market, but to do so will require quality porkers in reasonable quantity and a continuity of supply. No time should be lost in producing sufficient porkers to consolidate the position on the Home market before competition becomes keen once again.

To give encouragement in this direction and to cover the additional costs in the way of extra breeding stock and accommodation which will be required the Government has decided, in consultation with the National Pig Industry Council and the Meat Producers Board, to approve a premium of 1d. per lb. on porker-weight pigs as from May 15, 1950.

It is hoped that wherever possible farmers will provide the necessary extra accommodation and keep an extra sow. Those farmers depending on the weaner and store market for their pigs may be able to breed their own requirements for fattening. This change would generally be more profitable. Weaners and stores have been very dear in the spring months in recent years and will continue to be so until more sows are kept. With a total of fewer than 70,000 breeding sows in the country the industry is at its lowest ebb in this respect for 20 years.

Rapid Increase in Numbers Required

A rapid increase of at least 20 per cent. on present numbers is one of the most pressing needs of the industry. Better use of the sows we have would, of course, result in more pigs being available. If the standard of all could be brought up to that of the best quickly, so that 12 to 14 pigs per sow were marketed each year in place of 9 as at present, it would be a marked improvement.

I am anxious to see the pig industry in a healthy, thriving condition once again and I am sure that farmers will quickly realise that it is in their own ultimate interests and the interests of the country to put renewed efforts into pig production to consolidate the position and in particular our export market for porker carcasses.

K. J. HOLYOAKE, Minister of Agriculture.

CARE OF LIVESTOCK DURING AUGUST

Contributed by the Animal Research Division.

MILK FEVER AND STAGGERS

UNCOMPLICATED milk fever in cows 4 years old and upward is prevalent in grassy seasons. The number of cases may be reduced by putting such cows in a relatively bare paddock a week to 10 days before calving and feeding liberal amounts of good-quality hay. Complicated cases of milk fever (staggers) are more common in adverse seasons, especially among good-conditioned cows which lose weight rapidly after calving. Feeding autumn-saved pasture in breaks, sufficient for an hour's grazing, after each milking plus 40lb. of silage and as much hay as the cows will eat will help to prevent staggers, provided this type of feeding is continued until the spring pasture comes away and hardens up.

* * *

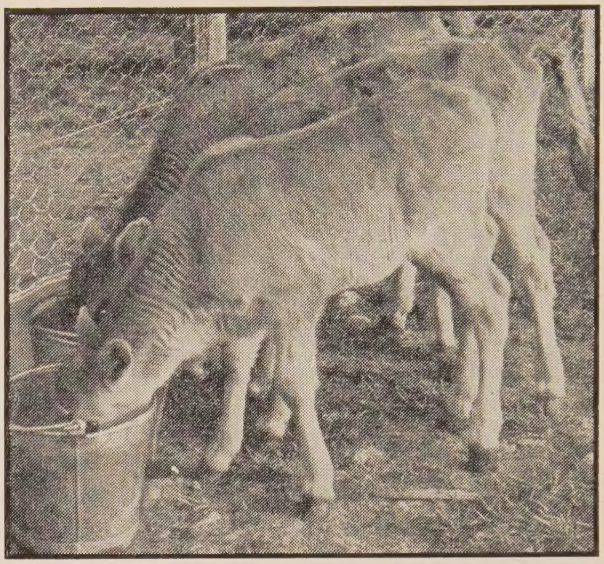
SELECTION OF CALVES FOR REPLACEMENTS

The productive ability of the herd's replacements sets the production level of the future herd. Use the son of a merit bull out of a L.M.R. cow as the herd sire. Save the daughters of such a sire out of the top half of the herd. Providing they are sturdy, the calves of old cows with good life-time performance should be kept and there is no reason why calves of well-bred heifers should not be reared. Twin heifers are seldom worth keeping and the twin of a bull calf should never be kept.

* * *

CARE OF LAMBING EWES

About 10 per cent. of all lambs are either born dead or die during the first week. These losses can be reduced by careful shepherding. Many lambs and some ewes can be saved by skilled assistance during lambing. Always use a reliable lubricating antiseptic on hands and wrists. Faulty presentations must be corrected. A lamb should never be pulled away forcibly when a leg or head is turned back. A number of lambs die from suffocation through the cleanings remaining over their nostrils. These are very easily removed. Where necessary lambs should be assisted to get a drink, particularly where ewes have very large teats. Drawing away a few squirts from these will reduce their size and enable the new-born lambs to suckle. Ewes with very large teats, very small teats, badly placed teats, or defective udders should be marked for culling, as a big percentage of their lambs will die. Many lambs which die during cold or wet weather would survive if they got a good drink soon after birth.



[*National Publicity Studios photo.*

CALF REARING

Calves should be fed their own mothers' milk for the first 3 days. This is important, as the first milk known as colostrum or "beastings" contains substances which increase a calf's resistance to scours. Since over-feeding is an important cause of this trouble, feed not more than 6 pints daily during the first week, 7 pints during the second week, and 8 pints during the third week. Diluting the milk ration with a quarter of its volume of water will also reduce the incidence of scours. If scours occur, a supply of a sulpha drug should be obtained from a veterinarian immediately, as the drug is very effective when used promptly. Calves should not be kept in a calf paddock. When 2 to 3 weeks of age they should be rotationally grazed ahead of the cows. Alternatively, rotate the calves through a minimum of 5 cow paddocks, in which not more than 5 days should be spent at a time in any one paddock.

* * *

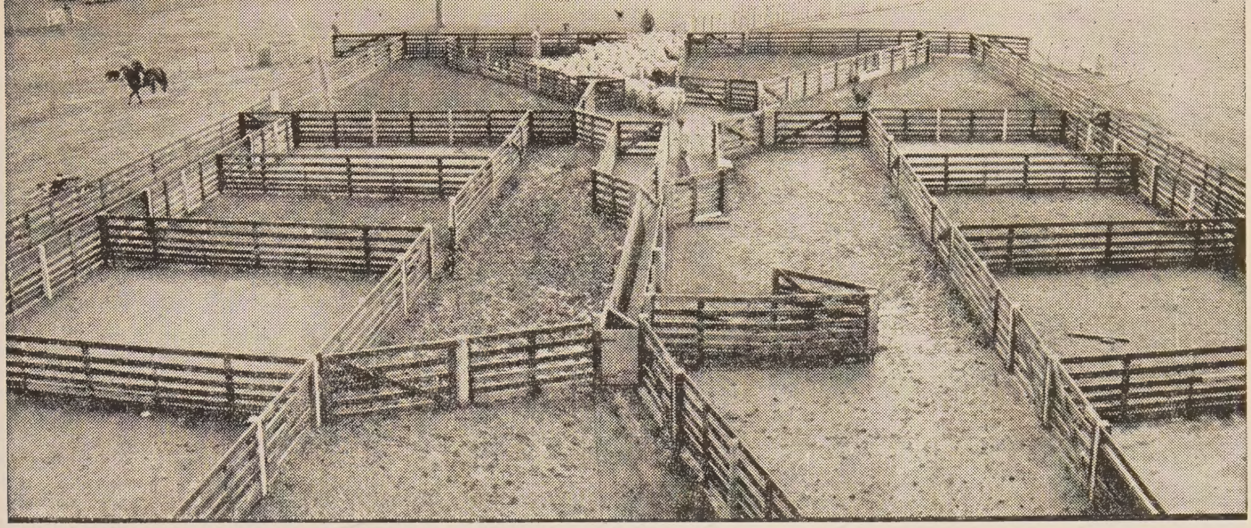
DISEASES OF CHICKS

Navel disease is contracted in the incubator, which should be cleaned scrupulously and fumigated with formalin between batches of chicks. Pullorum disease can be controlled only by repeated blood testing of all stock, immediate disposal of all reactors, and thorough cleaning and disinfection of premises after each test.

* * *

LICE ON CALVES

Calves and yearlings may become very lousy during late winter and early spring. Control can be effected by the use of suitable dips, sprays, or washes. Those containing D.D.T. or "Gammexane" are most effective. Repeated treatments may be necessary, as the eggs are difficult to destroy.



Design and Construction of Sheep-drafting Yards

By J. E. DUNCAN, Wool Supervisor, Department of Agriculture, Wellington.

OVER a period of years the volume of inquiries for plans and specifications of sheepyards and their accessories has shown that there is a constant demand for this information. Some inquiries are from young men just starting on their own, others from established farmers adding to or rebuilding their existing yards; but whatever the reason, the demand seems to be increasing. This is the first part of an article which aims to supply basic information covering most of the questions usually raised. The second and third parts will appear in the August and September issues of the "Journal."

IT is out of the question to give a plan of a drafting yard and say: "This is the ideal yard for working a flock of 3000 sheep." There is no "ideal" yard, simply because requirements and existing conditions vary so much from farm to farm. By listing and discussing some of the more important factors influencing the choice of a suitable type of yard and its construction it is hoped that the fundamentals will be covered to an extent enabling any farmer to use or modify the plans provided to fulfil his own requirements.

SITE

Choosing the best site for the yards is not always easy and a number of points must be considered:—

Central position: Other things being equal the yards should occupy a central position on the farm to avoid long drives for the sheep. Whether it will be feasible to have them in a central position will depend on a number of the other factors affecting site.

Question of attachment: When building a new set of yards, particularly if they will be the only set on the farm, the farmer usually desires to have them attached to the shearing shed and/or dip, so this will restrict the choice of position. However, where, as is often the case, there are other yards already on the farm, attached to the shed or elsewhere, there will be wider scope in selecting the site. If the farm is a large one, it is desirable to have yards where they will be within easy driving distance of the main blocks or paddocks. Road droving should be avoided wherever possible because of the detrimental effects of dust on the fleece.

The lie of the land is very important. Sheep work and draft best on a slight up-grade and it is easier for the man on the gate to see sheep approaching uphill. However, it is undesirable to have yards on a very steep slope, as the danger of smothering, particularly with lambs in a large yard, is greatly increased. If the forcing pens and the race and check pens run up a slight incline, it is quite satisfactory to have the rest of the yards on level ground. The size of the yards may be influenced by the lie of the land, as in many cases a good site, particularly in broken country, will be large enough for only a small set of yards.

The orientation of the yards, particularly the drafting race, must be considered in conjunction with the site. It is claimed by some experienced sheep men that sheep always run best toward the light, that is, into the sun; the drafting race should therefore point more or less north and south, with the crush pens south of the drafting gates. Of course it is seldom that both slope and orientation will work in exactly, and if there is direct conflict between them decision should rest on other considerations, such as the belief that sheep run better through a race toward their home paddocks.

Good drainage is a necessity. In most cases where the yards are on a slope the natural drainage will be good, but if they are entirely on level ground, an effort should be made to choose a site with a light porous type of soil. Gravel is best, but is not often available in the North Island. A poorly drained yard is very quickly churned into mud, and the sheep work reluctantly in it, quite apart from the fact that it will become disease infected more readily than a dry yard.

If the important conditions already outlined can be satisfactorily fulfilled, there are a number of other points which should be taken into consideration in selecting the site.

Shelter and shade: If, in choosing the site, advantage can be taken of a hill or patch of standing bush, or even a plantation, to break the force of the prevailing wind or southerly gales, it is all to the good. It may be possible to find a suitable site where a few isolated trees, which will be very valuable for shade, can be enclosed in the holding yards.

However, even after the yard has been built it is not too late to plant a few trees in suitable positions. One or two for shade in the large holding yards are much appreciated by sheep in hot weather. The planting of even single trees alongside the race is not recommended, as sheep tend to stop in the shady patch in hot weather, and moving shadows are apt to be troublesome. Quite apart from utility trees very greatly improve the appearance of a bare dusty yard; in fact they assist in preventing dusty conditions by preventing the soil from becoming parched. On the other hand too much shade in winter will keep the yard from drying out properly if the drainage is at all bad. In such a case it would be better, despite the trouble caused by falling leaves in autumn, to use deciduous trees, which will let in plenty of winter sun.

As a temporary measure, until such time as a shelter belt can be grown, an exposed windy yard can be improved greatly by interlacing scrub, such as cut manuka, in the outer fence along the whole of the windy side. Such a windbreak is very valuable for sheltering dipped sheep when a cold wind springs up unexpectedly.

Water supply: If the dip is included within the yards, a good water supply

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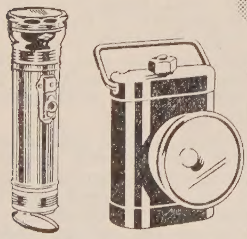

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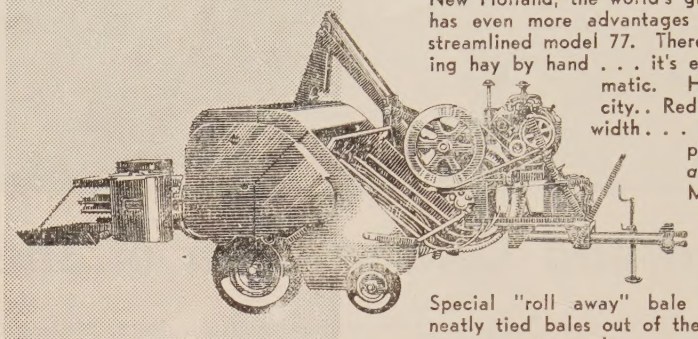

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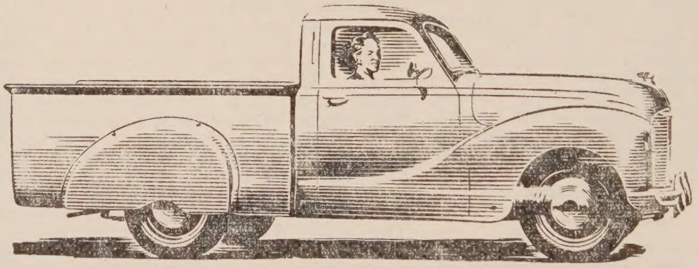

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is essential, but even in straight-out drafting yards it is desirable to have a good supply of drinking water available. Where the yards are on an isolated part of the farm and there is a lack of water the tail of the mob often has to be let out when the job in hand cannot be completed that day; a second muster is therefore necessary and time is lost simply because sheep could not be left in the yards without water. Water troughs should be available in all yards wherever possible. Sheep are frequently hot and thirsty when yarded after a long drive, and it is quite probable that fewer losses would occur at dipping if sheep were not dipped when thirsty.

In Australia yards are often sprinkled with water to lay the dust and in some of the larger yards a permanent sprinkler system is installed (Fig. 1). This practice could be adopted with advantage in some of the drier districts of New Zealand; the extent to which dust in wool mars its appearance and lowers its yield and hence its value is not generally appreciated. Even where sprinklers are used loose accumulations of dust and dried dung must be removed before the sprinklers are turned on or yards will become muddy.

SIZE OF YARDS

It is very difficult to arrive at any definite size of yards for a particular farm; size, as with type, will vary according to particular conditions.

The number of sheep and the number of separate mobs likely to be yarded at any one time is the first consideration, and is governed largely by the type of farming. If the size of the mobs to be handled is known, it is possible to estimate fairly closely the total area of yard space required. An average of 5 sq. ft. per sheep should be allowed; this average has been arrived at after measuring many existing yards of various types throughout New Zealand. Five square feet per sheep should allow ample room to work any but the largest sheep. In some Australian yards, designed of course for working the smaller types of Merinos, allowances as low as 3 sq. ft. per sheep are common, and appear to give satisfaction in practice.

Cost: Cost is frequently the limiting factor. A farmer may prefer yards capable of holding his whole flock at once, but has to be satisfied with smaller ones, particularly where there are more than one set of yards on the place. Further, it is usually better economy to build the nucleus of a set of yards in lasting, first-quality materials than to attempt to build a larger set of poorer timber, which will later entail heavy replacement costs. If proper provision is made in choosing the site and the arrangement of the "nucleus", it will not be difficult to enlarge the yards later when finance permits. With yards there is not the same need for providing in the first instance for future expansion of the flock as is the case when building a shearing shed, which cannot be added to so easily.

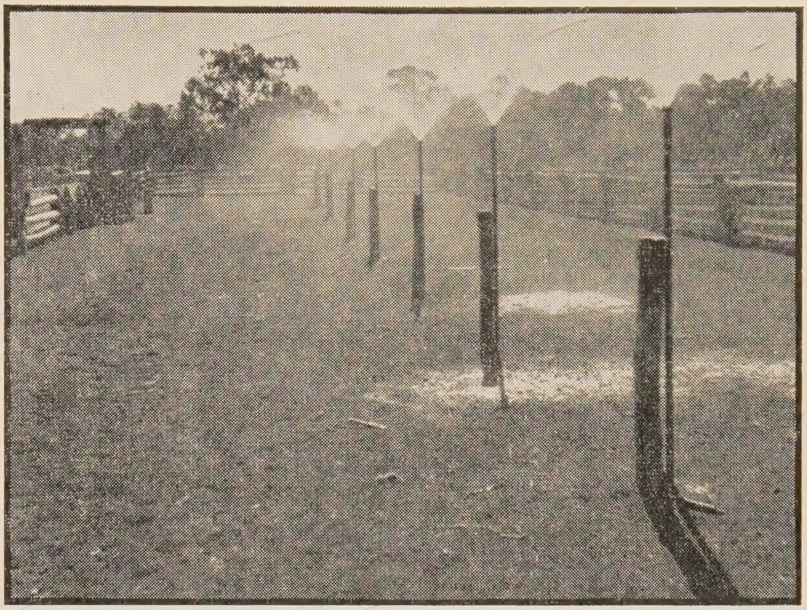


Fig. 1—Laying dust by use of sprinklers.

THE GENERAL LAYOUT

Layout is the hardest of all matters connected with design of yards to pin down to any set of rules. There are so many different types of yards from which to choose, all of which give satisfactory service and all of which have special advantages claimed for them by their enthusiastic protagonists.

Because drawings convey more than written descriptions, no attempt will be made at this stage to describe various yard layouts. The final section of this article will include a number of diagrams of fairly typical sheepyards with accompanying comments and descriptions.

The most common shape is, of course, the rectangular yard, but there are many others, such as the wedge-shaped, the circular, the "bugle," and many other "freak" yards.

Fig. 2, page 8, shows in diagrammatic form only the component parts and is not to be taken as representing an ideal yard, although this plan would form a useful basis which could be modified to suit individual requirements. It is usual and very desirable to have one or more small holding paddocks alongside the yards. These have many uses and where they are provided the receiving and holding yards can be smaller and less costly. Small holding paddocks are particularly useful at shearing time for holding sheep and allowing them to empty before entering the yards and shed, thus reducing the fouling of these to a minimum.

In general, large drafting yards embody the following subsections or divisions, but in small yards some of these will probably be omitted:—

The receiving yards, into which the sheep enter, which usually have a large capacity, sufficient to hold the biggest mob of sheep usually dealt with at any one time. They usually communicate with

The forwarding yards or pens, which are considerably smaller and consequently are useful for dealing with small mobs of sheep, as well as their function of leading up to

The crush or forcing pen(s): These are usually one or two long, small pens, frequently tapering at one end, and holding about 50 sheep. They in turn communicate by a two-way gate with the mouth of the

Drafting race: This race is long and narrow, just wide enough for the sheep to pass through in single file. Its purpose is to divide a mixed flock of sheep into any required number of smaller mobs, and for this purpose the race is fitted at its exit with one or more drafting gates, which guide the sheep into several

Drafting pens: These are small pens, and there is one for each way the sheep can be drafted. Where there are only two they frequently communicate direct with the holding yards, but in larger sets of yards one or more of these drafting pens communicate, via a gate, with

The check pen(s): These vary in number, corresponding with the number of drafting pens. Since their purpose is to hold the sheep while they are being checked over for mistakes in drafting and for treatment, these pens must also be small, and each usually has the same capacity as its drafting pen. The check pens in turn usually open into much larger

Holding yards, which correspond in size to the receiving yards.

In addition to the components mentioned there may be units such as a branding race and the sheep dip either with its own set of pens or sharing some sections of the general drafting yards.

Of course in a small set of yards it is not essential, or even necessary, to have all the subdivisions mentioned. The race and its immediately adjoining pens are the nucleus of a set of drafting yards, and in small yards they form the main part of the yards, the larger pens being few. Further, it must not be supposed that the various components listed earlier are necessarily arranged in a straight line. In practice this is often done, but provided the subdivisions follow in the sequence given, their actual arrangement is largely immaterial; for example, in circular-design yards the receiving yards and holding yards may be next to one another.

Other Factors

Several other factors play a part in determining the final layout:—

Use in conjunction with shed, etc.: Whether or not the yards have to be designed for use in conjunction with a woolshed and/or a sheep dip already in existence will affect the layout.

Size of yards and land available: In special cases it may be found necessary to have an unorthodox layout to fit a given size of yards to the land available, because of the topography or area at one's disposal.

The alteration in the external shape of the yards must not be allowed to alter the sequence of the different components.

The lie of the land: The drafting race is given first consideration and the rest of the yards are really built around it.

Fencing, etc.: It will simplify construction to have as many straight unbroken sections of fence as possible. This will save the work and expense of putting in extra strainer and corner posts, stays, etc. In designing the yards try to make a fence or a pen serve a dual purpose wherever possible; for example, in a set of circular yards the fences nearly all do this. Frequently yards can be designed so that pens can be used for more than one purpose —where sheep from the draining pens of the dip pass out into the holding yards, and where the run-through can be used for foot-rotting, dosing, lamb-picking, etc.

CONSTRUCTION

When a new set of yards is to be built and the site has been chosen the first step is to clear the area of any obstructions that are liable to injure the sheep and level off any very accentuated bumps in the ground. The site can be levelled quickly and at a reasonable cost with a modern bulldozer. From the plan (which it is assumed will have been drawn) distances should be measured and pegged off. Any logs and stumps close to the yards near gateways should also be cleared away.

Several methods of construction are suitable, but one of the fundamentals in construction of yards is to have all fences of adequate strength, whatever the material.

The small sketches in Fig. 5 on page 10 will give some idea of the alternatives for yard fences. It is realised in mentioning some of these that cement and steel are for the time being in short supply, but it is to be hoped that this is a passing phase.

All-timber Construction

Timber was the commonest material used in fence construction in the early days and is still largely used, although less is now being employed due to the increasing scarcity and cost of suitable timber. Provided good-quality wood of a lasting variety, for example, totara, was used, yards built of such timber would sometimes last half a century. Good timber yards entailed a fair amount of labour to erect, but once they were built replacement costs were low, both because replacements were not often necessary and because there was usually plenty of suitable timber at hand for the work. Unfortunately this is seldom the case today.

In Massey Agricultural College Bulletin No. 12, "Farm Trees and Hedges", by J. S. Yeates, the author states:—

> The durability of post timbers is a topic of endless argument. One man will put the useful life of a certain timber at two or three times the estimate made by another. Each man's estimate may be true for the particular posts and conditions he talks of. The trouble is that there are many reasons why timber of any given species may last longer at one time than another. Sap wood may be concerned in one case, heart wood in another; different varieties of the same species; rapidly-grown light timber or compact, slow-grown wood may be involved, and they may be used as posts on very different classes of soil; all these factors affect the length of life of posts.

It will be understood from the above that estimates of the life of posts can be expressed only as rough approximations. The durability of some common timbers (heart wood) as posts is shown below.

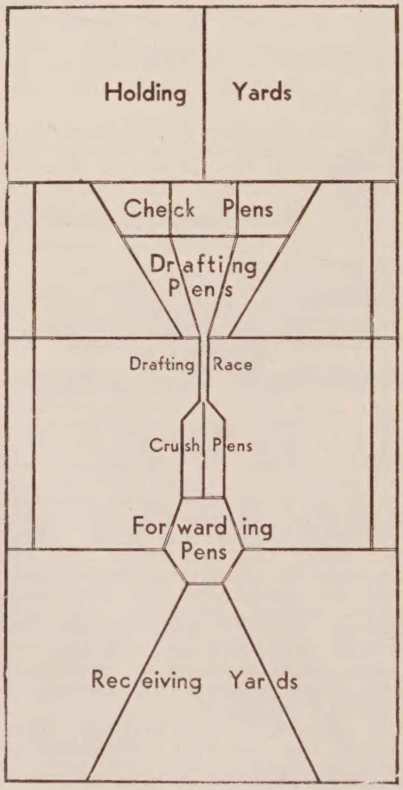


Fig. 2—Components of a sheep-drafting yard. (Not to scale; purely diagrammatic.)

More than 30 years:—

- Puriri (*Vitex lucens*)—up to 60-80 years common
- Silver pine (*Dacrydium colensoi*) —also extremely durable
- Totara (*Podocarpus totara* and *P. halli*)
- Broadleaf (*Griselinia littoralis*)
- Hinau (*Elaeocarpus dentatus*)
- Maire (*Olea cunninghami*)
- False acacia (*Robinia pseudacacia*)

From 15 to 30 years:—

- Kaikawaka (*Libocedrus bidwilli*), in some districts
- Kowhai (*Sophora tetraptera*)
- Black beech (*Nothofagus solandri*), when mature
- Red beech (*N. fusca*)
- Hard beech (*N. truncata*)
- Matai (*Podocarpus spicatus*)
- Jarrah (*Eucalyptus marginata*)
- *Cupressus macrocarpa* (probably)

From 10 to 20 years:—

- Peppermint gum (*Eucalyptus amygdalina*)
- White stringy bark gum (*E. eugenioides*)
- Camden woolly butt (*E. macarthuri*)
- White or manna gum (*E. viminalis*)
- Blue gum (*E. globulus*)
- Blackbutt (*E. pilularis*)

From 5 to 10 years:—

- Rewarewa (*Knightia excelsa*)
- Rata (*Metrosideros robusta*)
- White manuka (*Leptospermum ericoides*)
- Kamahi (*Weinmannia racemosa*)
- Tanekaha (*Phyllocladus trichomanoides*)
- Kauri (*Agathis australis*), resinous timber

Less than 5 years:—

- Pukatea (*Laurelia novae-zelandiae*)
- Rimu (*Dacrydium cupressinum*)
- Miro (*Podocarpus ferrugineus*)
- White pine (*P. dacrydioides*)
- Tawa (*Beilschmiedia tawa*)
- Taraire (*B. taraire*)
- Silver beech (*Nothofagus menziesi*)
- Insignis pine (*Pinus radiata*)
- Messmate, stringy bark gum (*Eucalyptus obliqua*)

The possibility of using "live" posts should also be kept in mind, i.e., the use of trees such as poplars or willows which can be planted as large cuttings which will grow and serve as posts from the first.

Preservative Treatment of Non-durable Woods

As the durable woods are becoming increasingly scarce, many more farmers will soon be faced with an acute problem when replacements are necessary. There are several apparent solutions to this problem, but the one which will now be considered briefly is that of preservative treatment of non-durable woods.

Almost without exception the durable timbers take a long time to grow. However, many of the non-durable timbers above can be grown to a size suitable for posts in a much shorter time. Their use untreated, for permanent fences, is not an economic proposition due to their short life and high replacement costs. However, by suitable treatment their life can be doubled or even quadrupled.

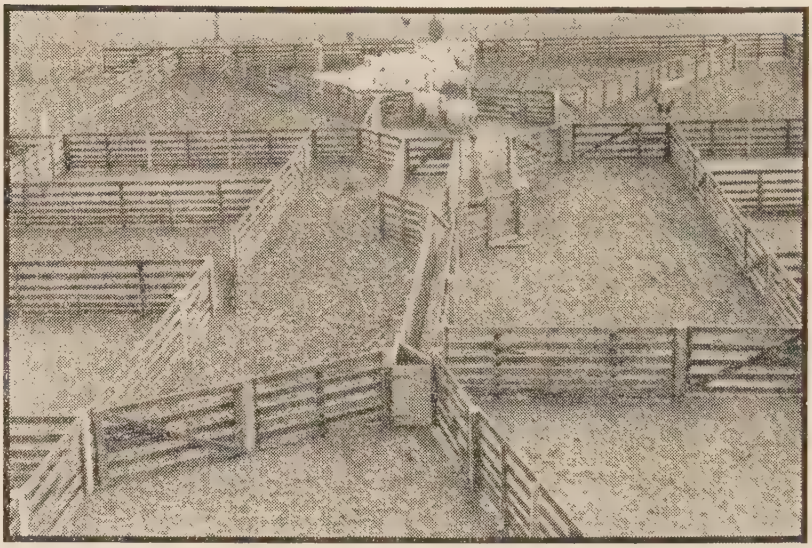


Fig. 4—A good layout; sheep entering the "diamond."

Ward of the New Zealand Forest Service quotes a case of creosote-treated white pine sleepers lasting for 14 to 30 years on the New Zealand railways and at the end of that time they were pulled up only because of mechanical failure, not because they rotted. He says:—

> The preservative is best injected into the wood under pressure, but for farm work, where pressure equipment is seldom available, creosote, introduced into posts by soaking them for some time first in hot and then in cold creosote, is an ideal preservative . . .

There is now at least one commercial process available to farmers in New Zealand by which they can have their own timber pressure treated with an effective and lasting preservative. The seasoned air-dry timber is loaded into a large steel cylinder where it is first subjected to a vacuum to remove the air from the wood cells, and then hot preservative is forced into the cylinder under high pressure so that it penetrates right through the wood, thus rendering sap and soft timbers more durable than the best heart grades, which are becoming increasingly scarce and dear. The cost of this treatment varies with the timber, but averages about £1 per 100 superficial feet—a price which is economic if compared with today's prices for heart timber; nor is heart timber always of the quality implied.

Full information on preserving of timber can be obtained from the New Zealand Forest Service and from other sources, but the following is a brief outline of the main points:—

Short-lived posts are a continuing liability, not only because of replacement costs but because of recurring labour charges.

The principle of preserving non-durable woods is to render them poisonous to decay organisms.

As it is impracticable to get preservative into all parts of the wood, a complete protective envelope of treated wood must be created. Any trimming, sawing, or cutting should therefore be done before, not after, treatment.

Heart wood is usually difficult to impregnate, and best results are frequently obtained by using round whole posts. The sap wood soaks up the preservative and a complete protective envelope is formed round the heart wood.

All bark must be removed to allow complete penetration, and any decayed wood should be removed before treatment, as there is the possibility that the decayed area may continue to spread afterward if deep seated.

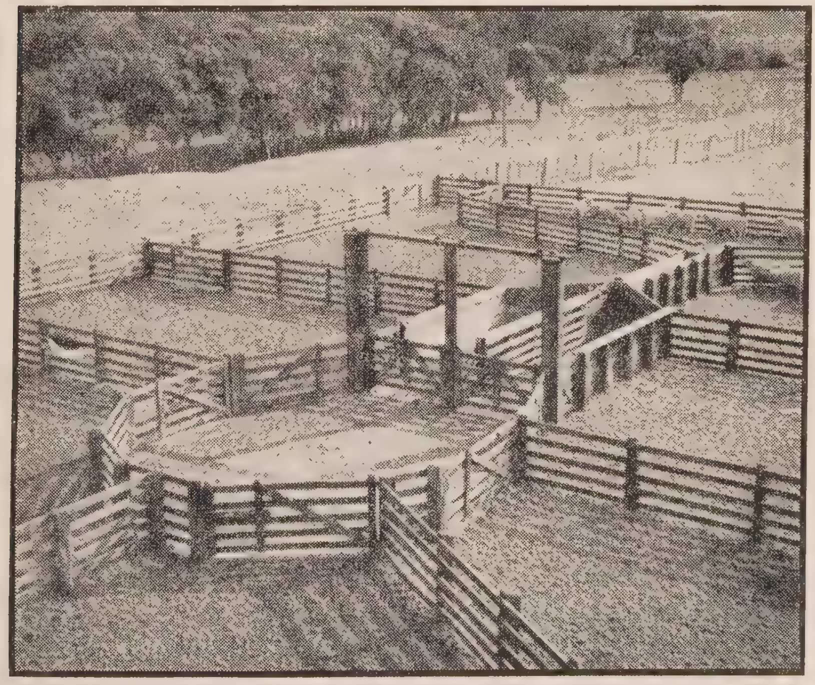


Fig. 3—The "diamond" and crush pens. Note the lift gates.

The wood should be well seasoned before being treated. (If green timber is creosoted, or worse, if it is sealed up with a coating of tar or pitch, internal rotting is likely to result.) With seasoned timber there is better penetration of the preservative and less subsequent splitting. Deep cracks extending into untreated wood are a means of entry for decay organisms

Creosote is probably still the best all-round preservative for farm use, but brushing and dipping are inadequate methods of applying it and are false economy. The hot and cold dip method is the one generally recommended for farm use.

Water-soluble preservatives are nearly all unsuitable for posts.

For the hot dip the creosote must be heated to from 180 to 200 degrees F., and precautions must be taken to avoid unnecessary fire risks.

Old oil drums are generally used as containers, but because their depth is insufficient, two handlings for each post are required, the butt ends and top ends being treated separately. If many posts are to be treated, the cost of a long horizontal tank is justified. Time in the hot bath (which comes first) varies from about 3 to 7 hours according to size and wood species. The time in the cold bath which follows should be not less than 14 hours, preferably more, say, overnight.

J. S. Yeates estimates the cost of treatment (including labour) at between 1s. 5d. and 2s. 9d. per post.

The New Zealand Forest Service has found that posts which untreated would have a life of 2 to 4 years after proper treatment by the hot and cold dip method lasted from 20 to 26 years

Post-and-rail Fence

Posts and rails form a strong and durable fence. The best method, but also the most laborious, is to have the rails on the inner side of the posts and checked into them so that the surface is flush. This helps to keep

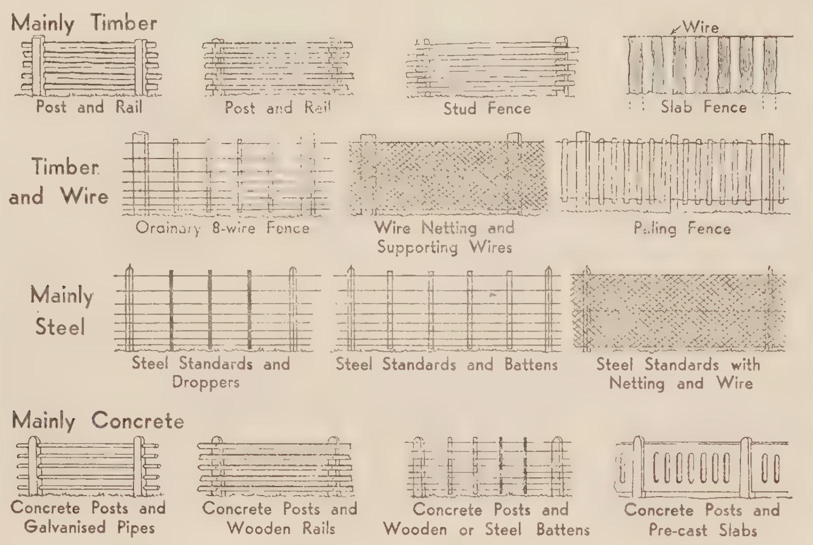

Mainly Timber
Wire
Post and Rail
Post and Rail
Stud Fence
Slab Fence
Timber and Wire
Ordinary 8-wire Fence
Wire Netting and Supporting Wires
Paling Fence
Mainly Steel
Steel Standards and Droppers
Steel Standards and Battens
Steel Standards with Netting and Wire
Mainly Concrete
Concrete Posts and Galvanised Pipes
Concrete Posts and Wooden Rails
Concrete Posts and Wooden or Steel Battens
Concrete Posts and Pre-cast Slabs

Fig. 5—Alternative designs and materials for fences.

the sheep from getting bruised. The more common method, which gives a fence which is as strong and involves less labour than when rails are checked in, is to have the rails spiked or wired to the faces of the posts, the check being omitted. Round timber is best, as it will last longest and is least likely to bruise the sheep. The bark must not be left on, as it will lead to rapid decay due to water lodging under it and fungi getting a start there. Sawn timber, though more expensive, is preferable to split timber, because splinters become detached from the latter. Where split rails are used the smooth or sap side, if there is one, should face inward, toward the sheep.

"Stud" Fence

The "stud" fence is not common in New Zealand, but is still used considerably in Australia. It is really a modification of the post-and-rail fence, the rails being round saplings closely spaced (Fig. 5, above). Such a fence is very satisfactory if good durable saplings can be obtained for the rails. They are barked and trimmed and either spiked or wired and stapled to the posts. A fence of this type begins to show decay first where the rails make contact with the posts and with each other. In gates and in all woodwork exposed to the weather it is the joints that rot first because they catch and hold rain-water. It is a good policy therefore to apply some preservative, such as tar and creosote mixture or one of the proprietary copper compounds, to joints, even if it is not applied elsewhere on the score of economy.

Slab Fence

The slab fence is seldom put up now because it is extravagant of timber; in fact it is really a relic of the days when timber was very cheap. Its only special virtue is its strength. The whole fence is composed of posts, or rather slabs, say 3in. x 8in., which are set in the ground like posts with 3in. or 4in. spaces between them. Sometimes a wire or a capping rail is run along the top to help prevent them from being knocked out of line.

Timber and Wire Construction

Normal Construction

Timber and wire fencing for yards is done in the usual manner except that generally posts, battens, and wires are all more numerous, for extra strength, than in the ordinary farm fence. When wire was readily available 8, 9, or even 10 wires were used. The lower ones were gauged close together to prevent lambs getting through. Often now fewer wires are used, but a narrow strip of netting is run around the bottom of the fence to keep lambs in. Posts are spaced about every 10ft., and there are about 5 battens to a panel. Metal droppers may be used, but usually when wooden posts are obtainable at an economic price wooden battens are used.

Wire and Netting

For the outer fences of large receiving and holding yards considerable economy can be effected by using a light type of fencing. These fences are not subjected to the same strains and rough usage as those of the smaller pens and crushes, and the same strength is not required. The posts are put in in the usual way, but wire netting of one kind or another is used. With netting of the old light type 3 or 4 No. 8-gauge wires are required to give it rigidity, but with some of the heavier types of netting with locked or welded joints no supporting wires are needed. Occasionally sheep not noticing the netting in time have been injured by colliding violently with it. This trouble could be avoided by having a single light rail along the centre.

Wire and Paling Fence

The wire and paling fence is quite useful for light duty and could be used successfully where there is plenty of suitable wood for making the palings. Only short lengths are required. The palings are interwoven by a double No. 8 wire at the top and a double No. 8 wire at the bottom. When the wires are tight the palings will not need stapling. The wires may be stapled to posts in the usual way, and where the posts are fairly well spaced it is advisable to drive in a stake in the centre of each panel and staple it to the wires to steady the fence. In practice, due to the weight of such a fence and its swinging in the wind, the wire tends to cut on the staples and often it is better to bore the posts and thread the wire through the holes.

Construction Using Mainly Metal

Standards and Droppers

The particular sphere of usefulness of fences of standards and droppers is under conditions such as are common in parts of Australia; that is, where suitable timber is unobtainable or prohibitively dear, where there is no gravel and sand suitable for concrete posts and freight on cement is high, and where there is considerable risk from fire and destruction by pests such as termites. Steel posts or standards also have the advantage of being quick to erect, since they are driven into the ground and the steel droppers can be rapidly clipped in position. The main disadvantages are cost and deterioration in a wet climate due to corrosion. At present the steel shortage virtually rules out this type of fence.

It is possible that in some areas in the South Island, such as Central Otago, some of the conditions exist which justify the use of steel posts, and this type of construction could with advantage be used.

Metal and Wood

In certain instances it may be difficult and expensive to get timber suitable for posts, yet timber which would do for battens may be available. In such a case, if concrete posts are also out of the question, steel posts can be used with wooden battens.

Steel Posts, Wire, and Netting

It is unnecessary to go into details for using steel posts, wire, and netting, as steel posts and battens can be substituted for wooden in any of the cases where these are used.

It is interesting to note in passing that dividing fences constructed of steel or concrete posts with panels of galvanised iron have been used in some Australian yards. They are strong, durable, fireproof, and easily disinfected if necessary. They can also be arranged so that the sheep can see only in the direction in which they are moving, which is an additional advantage. Unfortunately, scarcity of materials and cost rule out this type of yard for the time being.

Concrete construction will be dealt with in next month's issue.

Identical Twin Calves for Research

IDENTICAL twin calves will again be required this season to enable special research work to be carried out at the Department of Agriculture Animal Research Stations at Ruakura and Wallaceville. Through the co-operation of farmers in the South Auckland district, 35 sets of heifers were collected last year. As a still greater number is required this season, it has been decided to attempt to locate twins for a limited period in July and August in Northland and Taranaki.

Identical triplet heifer calves.

ORDINARY or fraternal twins develop from two different eggs fertilised by two different sperms and are no more alike than full brothers or full sisters. It has been calculated that approximately 90 per cent. of all cattle twins are fraternal. This type of twinning depends at least to a certain degree on inherited factors, as shown partly by the well-known fact that twinning tends to "run in families" and partly by the differences in twinning rate recorded in various breeds of cattle.

Breed	Twinning rate Per cent.
Friesians	3.5
Ayrshire	1.8
Jersey	1.0
Beef breeds	0.5

The sex combinations of fraternal twins show approximately the following relationship:—

Bull-bull Per cent.	Bull-heifer Per cent.	Heifer-heifer Per cent.
25	50	25

A peculiarity in cattle twins not shared by twins of any other species is that in most cases they have a common or intermingled blood system leading to their mother's placenta which makes blood interchange between the unborn twins possible. This is the mechanism that underlies the condition known as the "free-martin"; that is a twin heifer which can never breed. Free-martins are always co-twins to bulls, and the explanation for their occurrence is as follows: The sexual organs of the bull twin mature earlier than those of the heifer twin and begin to secrete hormones at a fairly early stage of pregnancy. Because of the common blood system these hormones circulate in the heifer calf and suppress the development of her sexual organs. A heifer of this type will never show heat. About 10 per cent. of all cattle twins have separate blood systems, which explains why occasionally a heifer calf born co-twin to a bull will be a breeder. However, as it is very difficult to distinguish between a free-martin and a normal heifer calf, it is only under exceptional circumstances that a heifer born as twin to a bull is worth keeping. Bull twins always are fertile whether born twin to heifers or bulls. A heifer calf which is co-twin to another heifer naturally is also normal.

Identical Triplets

Twins are called identical if they have developed from one egg fertilised by one sperm; such animals have exactly the same inheritance and so must be similar in most respects. Triplets, quadruplets, and even quintuplets may develop in this manner. However, in cattle such multiple births are exceedingly rare. It has been calculated that identical triplet heifers occur only once in every 4,000,000 calvings. In the 6 years of twin collection work Ruakura has located 2 sets of these rarities. Illustrated is a set of pedigree Jersey triplets born this year in the herd of Mr. Wm. S. McEwen, of Tamahere.

As far as is known identical twinning does not depend on inheritance. In nearly 250 calvings at Ruakura identical twins have not yet been borne by identical twin cows.

Recognition of Identical Twins

Identical twins are always of the same sex, but in addition they must be very similar in other respects such as size, head shape, hair whorls, coat colour, body conformation, and pigmentation of mouth, tongue, muzzle, ears, and hooves.

Distinctively marked identical twin cows at Ruakura.

In examination for recognition of identical twins the calves' heads should be held together and each point examined separately. As experience has shown that identical twins show no differences in coat colour and colour distribution, great importance must be attached to these features. Any colour differences will show up more easily if a finger is pushed against the grain of the hair so that the undercoat can be seen. Hair whorls are usually found on the forehead, poll, back, and often above the eyes, and should generally be of approximately the same shape and in the same position on both calves. The calves should be turned on their backs and their bellies examined, as colour differences not previously noticed often show up there. Little attention should be paid to differences in white spotting.

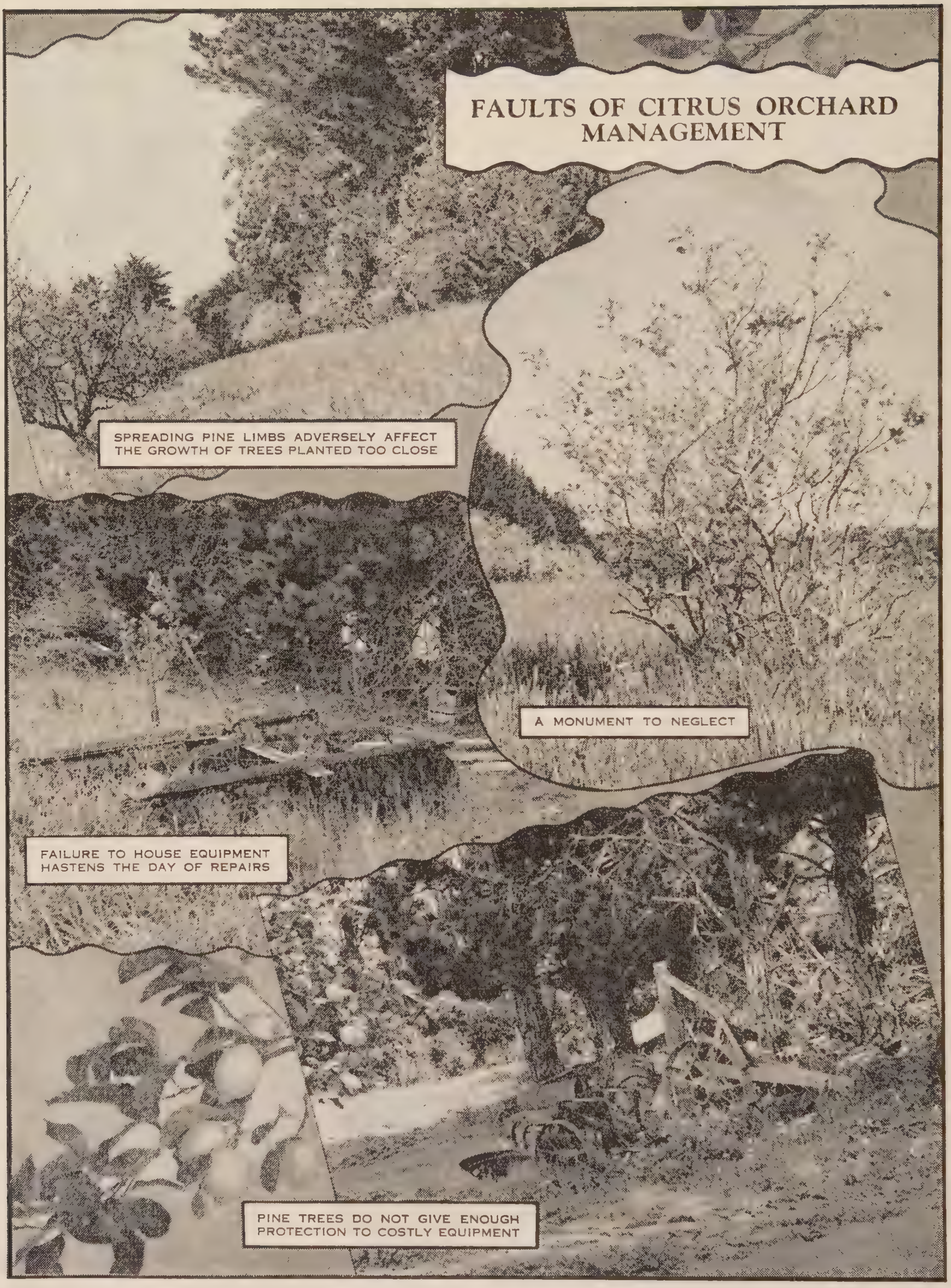
Collection and Payment

Farmers south of Auckland who believe they have a set of identical twin calves are asked to advise Ruakura Animal Research Station, Private Bag, Hamilton, by letter or by telephone (4790 Hamilton). Taranaki and Northland farmers should advise the Department of Agriculture in New Plymouth and Whangarei respectively.

Farmers advising Ruakura by letter should give their exact and full address (district, road, and telephone number), as much valuable time may be wasted in trying to find the farm if an inadequate address is given. As soon as possible after receipt of advice an officer of the Station will visit the farm and inspect the calves. Those judged to be identical will be bought at £2 10s. a head plus 1s. 6d. a head per day up to 10 days of age to cover the cost of rearing. Older calves will be bought by arrangement. The Station prefers to take over the calves when they are about a fortnight old. In Taranaki and Northland it will be possible to inspect twins only about once every 8 days, beginning from the last week in July.

Only identical heifer twins are required this year.

FAULTS OF CITRUS ORCHARD MANAGEMENT



SPREADING PINE LIMBS ADVERSELY AFFECT THE GROWTH OF TREES PLANTED TOO CLOSE

A MONUMENT TO NEGLECT

FAILURE TO HOUSE EQUIPMENT HASTENS THE DAY OF REPAIRS

PINE TREES DO NOT GIVE ENOUGH PROTECTION TO COSTLY EQUIPMENT

[Sparrow Industrial Pictures Ltd. photos.

Reducing Production Costs in Citrus Orchards

By P. EVERETT, Orchard Instructor,
Department of Agriculture, Auckland.

DURING and since the Second World War the cost of producing essential commodities in New Zealand has risen more or less steadily. To counteract such increases and yet maintain production the general trend has been for producers to increase the selling prices of their goods if possible. This spiral of ascending prices must reach its peak some day, and that day may not be far distant. When that time arrives the citrus-fruit grower, like all other producers, will be faced with the problem of how best to reduce production costs so that the margin between the cost of growing fruit and placing it on the market and the price that can be secured for that fruit will remain in favour of the grower.

WHOLESALE prices for New Zealand grapefruit and Meyer lemons have declined markedly from those of a few years ago, and should this position continue efforts must be made to effect an early reduction in costs of production. Though the collective efforts of the industry may assist in this direction, the principal reductions likely to be achieved will be in the individual orchard and packing shed. The cost of producing citrus fruits in New Zealand is influenced by a great variety of factors, including soil type, variety, strain, amount and type of cultivation, manurial programme, shelter, aspect, and marketing arrangements, but that which exerts probably a greater influence on production costs than any of those mentioned is orchard management.

Following are some of the many factors that should be examined as possible means whereby production costs might be reduced or, alternatively, buyers induced to pay higher prices for the fruit they require.

More efficient management.
Increased production.
Increased percentage of high-grade fruit.
More attractive presentation of fruit.
Reduced cost of preparing fruit for market.
Improved marketing methods.

Efficiency of Management

The factors included in orchard management are generally known to fruit growers, but the need and scope for greater management efficiency possibly is not fully appreciated.

To reduce production costs to a minimum it is essential that the citrus-fruit grower be fully efficient and have an intimate knowledge of the requirements of citrus trees, especially in such items as fertilisers, organic matter, and lime; he must know how these materials are best applied and worked into the soil and the number of applications and quantities needed each year. The rooting habits and irrigation requirements of the trees and soil conditions necessary for the production of maximum crops of high-quality fruit at a minimum cost are among the many other aspects of which comprehensive knowledge is necessary.

Another subject with which every citrus orchardist requires to be intimately acquainted is disease and pest control. This necessitates rapid identification and familiarity with the best of known control measures which are consistent with economy; in the case of many kinds of insect pests it also involves knowledge of their life cycles under local conditions.

In the main, this knowledge is available to all citrus-fruit growers who care to seek it earnestly. Some years of practical orchard experience coupled with keen observation will provide many of the answers to the questions involved, but this is not sufficient to keep up with present-day knowledge. A constant perusal of modern literature dealing with the problems involved, attendance at lectures and demonstrations concerning citrus culture, and submission of questions to the district Orchard Instructor of the

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HEADING PHOTOGRAPH: Healthy trees in a well-managed citrus orchard. Sparrow Industrial Pictures Ltd. photo.

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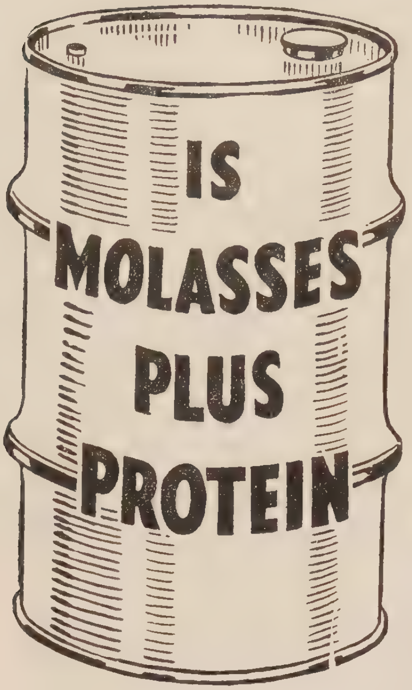

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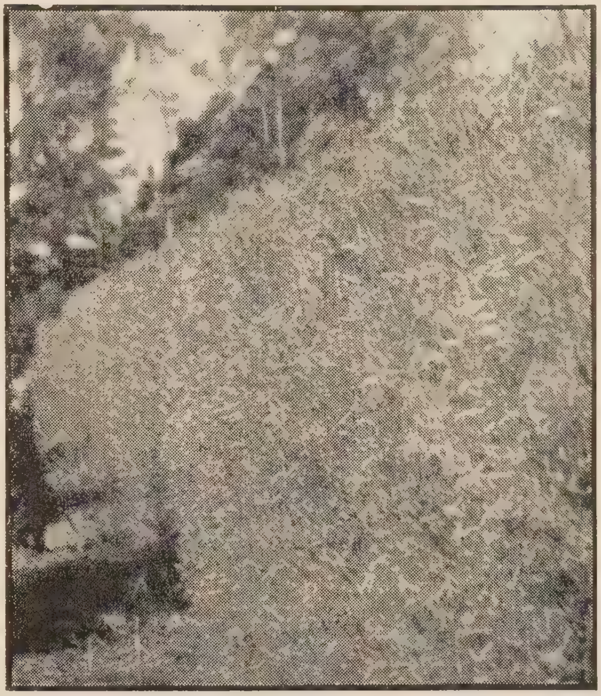
Department of Agriculture are also necessary to acquire the ever-changing knowledge essential for good orchard management.

The efficient grower anticipates nearly all orchard operations and makes suitable and early arrangements for the supply of materials and labour. To do this he must make reasonably accurate estimates of the fruit to be picked each month and the dates when sprays or cultivations will be required.

Any departure from more-or-less standard practices in orchard management to test new ideas should be limited to a relatively few trees. There should be one or two replications of the experimental treatment, and suitable check trees should be selected for comparison. The keeping of accurate crop records and the noting of regular observations are also essential in any experiment. Tests conducted in this way for sufficiently long to give a reliable indication of results are to be encouraged.

Orchard tests on a large scale, if conducted by an individual orchardist, in most cases indicate inefficient orchard management, as the risks taken and expenses involved are needlessly great. Such tests usually are abandoned before results are conclusive. There is also a distinct danger that such experiments may result in wrong conclusions and lead to further waste and bad management.



Neat and regular trimming of shelter belts indicates efficient orchard management.

Increasing Production

Any advice given to increase production when the trend of prices is downward and produce is slow of sale no doubt will seem foolish to many growers, but in general the greater the production per unit the lower the cost, and so the producer may well be in a position to accept lower prices.

Admittedly, there is a level at which any increase in production cannot be absorbed by the consumer, but artificial consumption levels are often created by prices being too high for the average consumer to buy his full requirements. Though sales may become slow at some artificial level, demand often may be stimulated by a lowering of prices.

The production of many orchards could be raised by more adequate fertiliser applications, more judicious pruning, and improvement of soil conditions. Many holdings are too small to be economic, and in such cases additional land should be planted or acquired. A minimum production of 2000 bushels of lemons or grapefruit from a single-handed farm is desirable; where labour is employed a greater production per unit is necessary.

Grading Standards

The percentage of high-grade fruit marketed from most citrus orchards could be increased substantially by more frequent pickings and greater care in selecting and handling the fruit. Grapefruit and sweet oranges in particular when allowed to remain on the tree for several weeks after becoming fully sweetened usually become "puffy," and in some cases the juice content decreases appreciably and the flavour becomes less palatable. Lemons allowed to tree ripen become suitable only for peel and juice grades. By increasing the number of pickings, and by the pickers selecting with the greatest possible care only fruit that is at the correct maturity, the over-all quality of the produce marketed can be raised appreciably. The elimination of fruits regarded as being of doubtful quality would also assist. Any such improvements in the quality of citrus fruit should stimulate demand and result in higher market prices.

The quality of New Zealand-grown citrus fruits offered for sale before 1939 in the main was commendably high, but the abnormal demand for such fruit during the war and subsequently—the result of greatly restricted imports—in many instances made possible relatively high prices for very poor fruit.

Those conditions have not offered an inducement to growers to maintain their former high standards of quality grading and packing, but the over-supply of New Zealand grapefruit in particular during July, August, and September of the past 2 years indicates the urgent need for a return to pre-war standards.

Preparing Fruit for Market

Experienced growers of citrus fruits are in general agreement that under normal marketing conditions the cost of presenting fruit attractively is more than justified by the increased price received. The buyer likes to see cases well filled with fruit of a uniform size and neatly packed. Branding, whether done by stencil or rubber stamp, should be neat and clear, or printed labels should be used.

Some fruits of certain varieties of sweet orange and grapefruit which normally mature late in the season fail to develop full colour on the trees even when fully sweetened. Fully coloured fruit is preferred in the markets, so those showing any trace of green colour should be orchard stored under cool and moist conditions until they are fully coloured.

A reduction in the cost of preparing fruit for market usually necessitates some improvement in packing-shed technique or equipment. If the quantity of fruit to be marketed is relatively small, the possibility of having the crop graded and packed in an up-to-date packing shed of a neighbour or local organisation should be considered.

Marketing Methods

Standard lemons have been marketed in New Zealand through the Marketing Department since May 1, 1939, but the success of marketing still depends largely on the quality of the product delivered to the Department.

Where citrus fruit is being disposed of principally by auction it is the responsibility of the grower to determine picking dates and to select the markets to which the fruit will be consigned. To do this intelligently and thereby secure maximum net realisations he must be familiar with market trends in previous years, know exactly the freight costs to each market, and at times sound out markets by telephone or telegraph a few hours before dispatching a consignment. Adequate time and thought given to such questions usually is reflected in worthwhile increases in realisations.

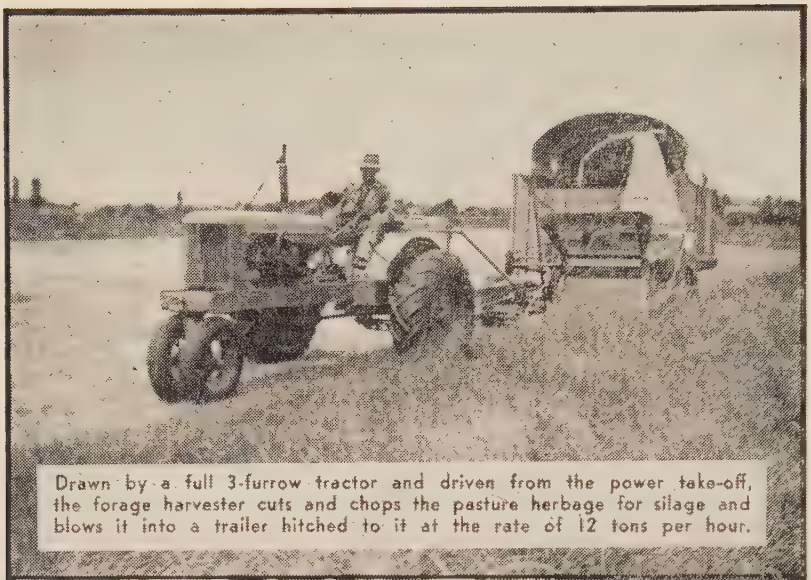
In general, it is advantageous to build up a good name with a few reliable firms and stay with them.

Co-operation Essential

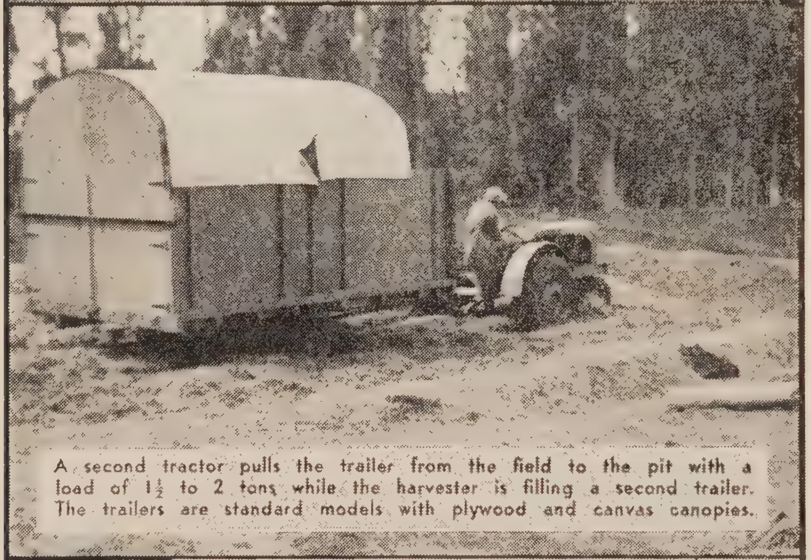
No attempt has been made in this article to name more than a few of the factors offering scope for improved cultural and marketing practices, but the suggestions made may lead to a fuller realisation of the need for greater efficiency, not only in the work of the individual orchardist, but also in the co-operative efforts of the citrus-fruit industry as a whole. The active interest of all growers in the collective efforts of their industry is an essential part of good orchard management.

THE FORAGE HARVESTER:

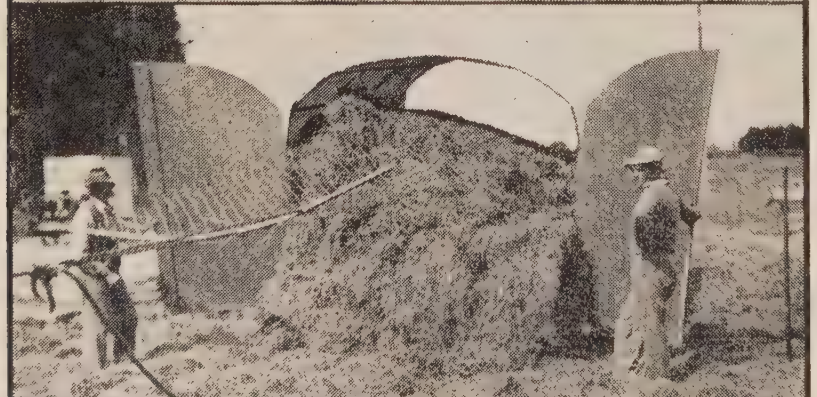
By C. J. CROSBIE,
Farm Machinery Instructor,



Drawn by a full 3-furrow tractor and driven from the power take-off, the forage harvester cuts and chops the pasture herbage for silage and blows it into a trailer hitched to it at the rate of 12 tons per hour.



A second tractor pulls the trailer from the field to the pit with a load of 1½ to 2 tons while the harvester is filling a second trailer. The trailers are standard models with plywood and canvas canopies.



A rope attached to a third tractor or to two horses is passed over the load and attached to the free end of a wire apron on which the load rests, and the load is rolled out. Total stay in the pit is about 4½ minutes.

YET another machine that reduces markedly the man hours required for harvesting hay and silage, the forage harvester was introduced to New Zealand when Mr. D. J. Stewart set his machine to work at Woodend, North Canterbury, at the end of November, 1948, in a field of lucerne, from which silage was made. Following the mower, his machine picked up the material from the windrow, chopped it, and blew it into a trailer which was drawn parallel to it. At the stack site the cut material was forked into a blower and blown to the top of the stack, where the flow was directed to fill the framework that formed the stack. On completion the stack was earthed over in the usual way to form a silage that could be fed out easily from the stack and was relished by stock.

Machine with Cutter Bar

During the most recent harvest another forage harvester of a different make was introduced and tried extensively in most districts of the South Island. The harvesting of silage material with this equipment on the farm of Messrs. Johns brothers, Belfast, Canterbury, is illustrated in the photographs reproduced on these pages. This machine differs from the first in that it is equipped with a cutter bar and therefore can be drawn directly into a standing crop to cut and chop the material and blow it into the trailer.

Messrs. Johns milk 260 to 270 cows in four herds for town supply, so their requirements for winter supplementary feed are high. It has been their practice to save irrigated pasture for silage, and this year three large pits were filled.

Speed of Operation

The forage harvester, which is driven from the tractor power take-off, requires a full 3-furrow tractor to pull it in the heavy mixed pastures common in New Zealand. In lucerne the going is much easier and the tractor can be operated in a higher gear. Working in the heavy pasture silage crop shown on this page the

A Labour-saving Machine for Silage Making

Department of Agriculture,
Christchurch.

machine handled the material at the rate of 12 tons per hour, but, allowing time for stoppages to replace the filled trailers, 7 tons was the rate under working conditions. The trailers, which were hitched directly to the rear of the harvester, were standard models with canopies of plywood and canvas attached. Though each trailer was capable of carrying 5 tons, it was found convenient to blow a load of only 1½ to 2 tons into them, the load being distributed by deflecting the hood of the blower so that the trailer was not loaded too heavily in front. Two trailers were used and a separate tractor hauled them between the field and the pit, the journey taking an average of 6 minutes.

Method of Unloading

When a trailer arrived at the pit a further 4½ minutes was spent in unloading it for its return to the field. After the back doors had been opened a rope attached to a third tractor or to two horses was passed over the load and fastened to the free front end of a strip of wire mesh on which the load was resting, and by this means the load was rolled out of the trailer. One man could spread the load in 4 minutes, leaving him time to spray the material at intervals and when necessary to drive the third tractor over the material in the pit to compact it.

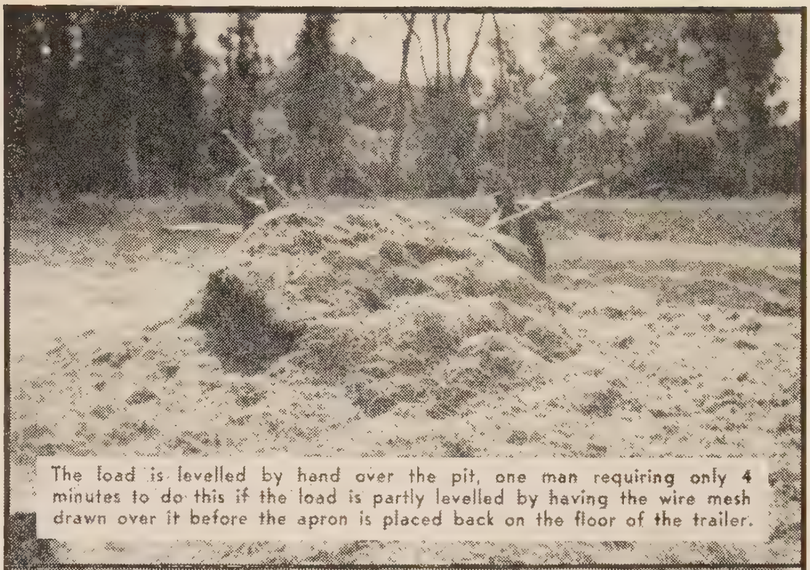
Thus a team of three (sometimes an extra man was employed at the pit) was able to harvest green material from 75 acres at the rate of 7 tons per hour to fill three large pits—in all nearly 800 tons of silage.

Other Attachments

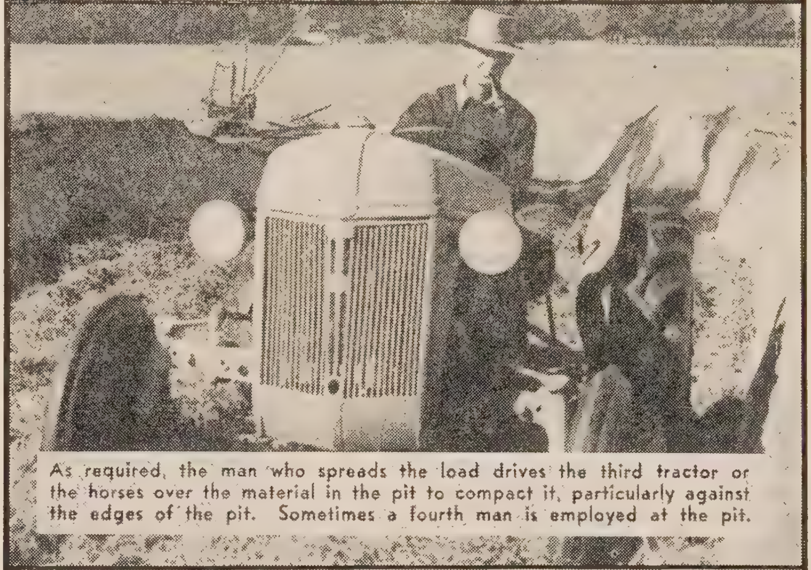
The machine also has a pick-up attachment for lifting and chopping material such as hay from the windrow, and a blower is available for blowing either hay or silage up into hay lofts or silos. Another attachment will cut a crop such as maize from a row.

This machine would appear to have a great future in New Zealand, for it can do much to reduce the labour of stock-food conservation and feeding out. The chopped silage can be forked from the stack with ease, and no knife is needed to make vertical cuts.

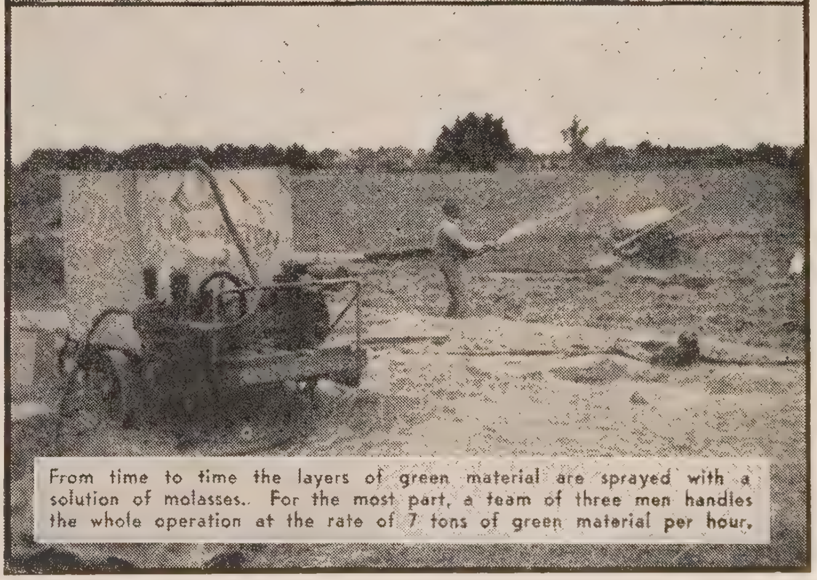
Middle photograph on this page by Coates.



The load is levelled by hand over the pit, one man requiring only 4 minutes to do this if the load is partly levelled by having the wire mesh drawn over it before the apron is placed back on the floor of the trailer.



As required, the man who spreads the load drives the third tractor or the horses over the material in the pit to compact it, particularly against the edges of the pit. Sometimes a fourth man is employed at the pit.



From time to time the layers of green material are sprayed with a solution of molasses. For the most part, a team of three men handles the whole operation at the rate of 7 tons of green material per hour.

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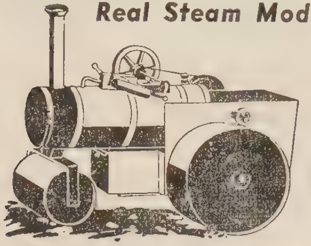

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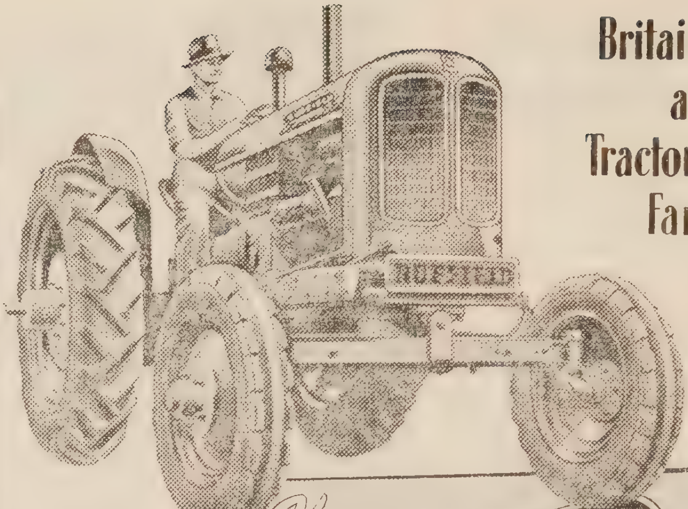

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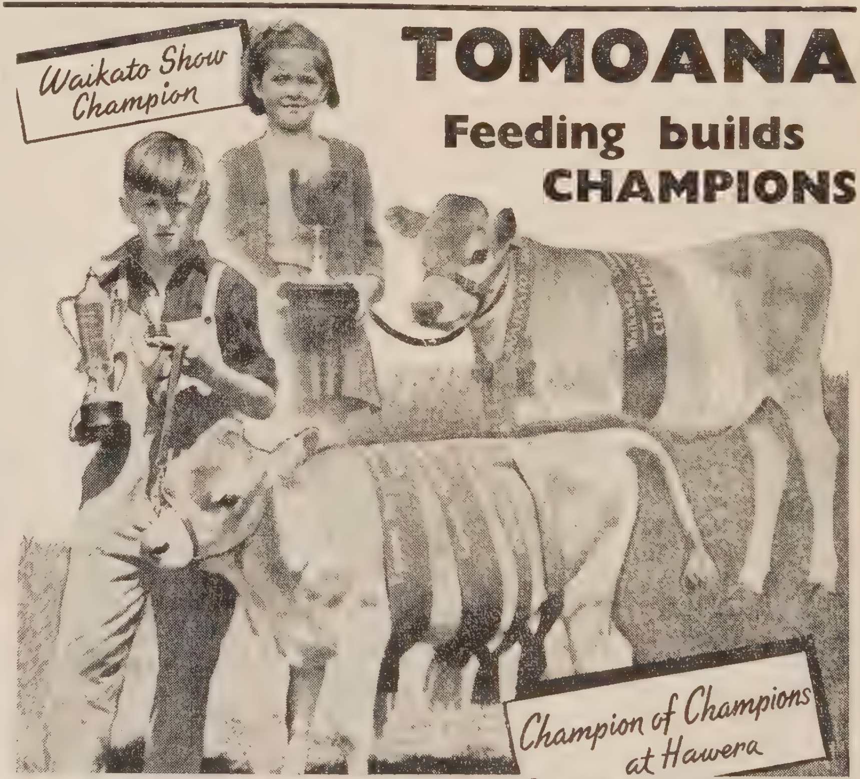
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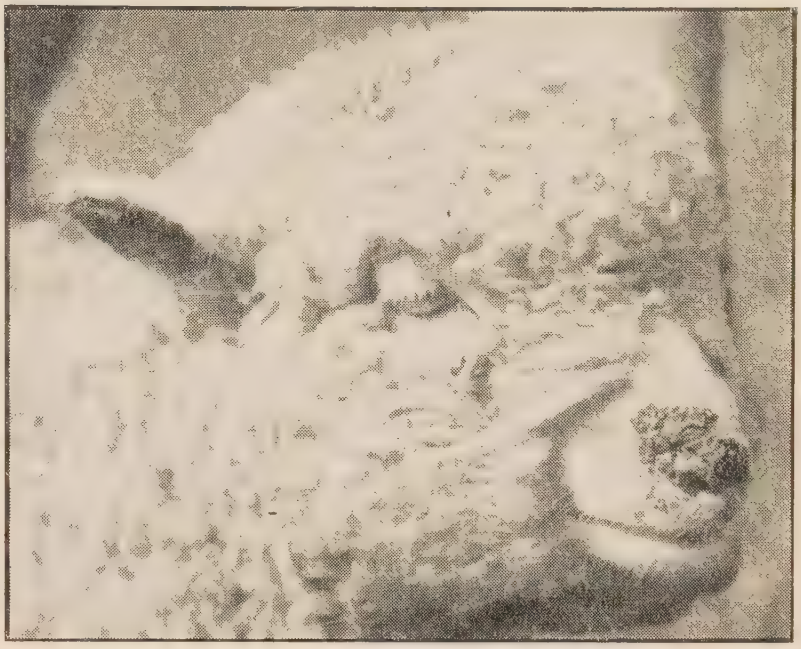
Vaccination of Sheep against Scabby Mouth

By J. J. G. PEDDIE, Bacteriologist,
Department of Agriculture
Animal Research Station,
Wallaceville.

CONTAGIOUS ecthyma vaccine issued by the Department of Agriculture Animal Research Station, Wallaceville, is, if properly used, 100 per cent. efficient in preventing scabby mouth in inoculated sheep.

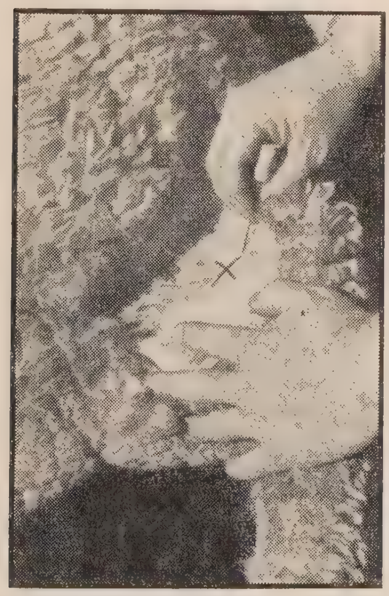


A mild case of contagious ecthyma (scabby nose).

DURING the past season several flock owners have written stating that lambs vaccinated against contagious ecthyma have subsequently developed the disease. If such breakdowns were the result of a faulty vaccine or due to the presence of a new disease, the position would be serious. In almost every instance of possible breakdowns the vaccine issued and affected sheep or material from affected sheep were tested at Wallaceville. In all tests the vaccine proved active and thoroughly effective in preventing subsequent development of the disease. Contagious ecthyma proved to be the trouble with all affected sheep or material from affected sheep, so that a new disease of similar type cannot be stated to exist. Further, some flocks in which breakdowns had occurred showed positive "takes" to revaccination.

Failure on Part of Vaccinator

From the facts it is clear that the failure has been on the part of the vaccinator. Two main factors seem to be involved in such cases: First, the wax-like material normally found on the skin of the sheep clogs the eye of the needle so that little or no vaccine is removed from the bottle when the needle is dipped. Care must therefore be taken to keep the eye of the needle cleaned. To do this it is essential not only to wipe the needle but also to dab it either in the wool of the sheep or in cottonwool. Secondly, the pressure used in scarifying should be sufficient to break the skin surface. This does not necessarily mean that blood should be drawn, but it is better to err on the safe side and scratch firmly.



The method of vaccination. Lambs are vaccinated on the bare skin on the inner side of the thigh.

The vaccine is supplied as a powder contained in a small phial. Each phial contains sufficient material to vaccinate 500 animals. It is not economic to make this vaccine up in smaller amounts, so that if smaller numbers of animals are to be treated one phial is made up and unused vaccine is thrown out. The strength at which the vaccine is used is four times greater than necessary, so that there is a large margin of safety.

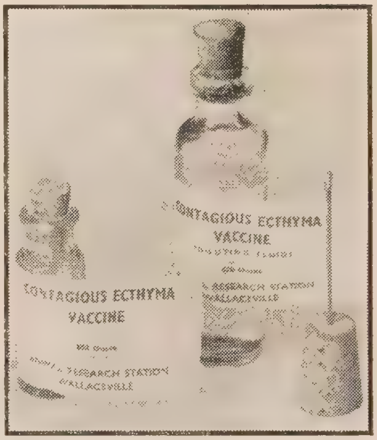
Method of Vaccination

The method of vaccination is as follows:—

1. The powder in the small phial is added to the bottle of diluting fluid supplied and this is shaken vigorously to ensure thorough mixing.

2. Lambs are vaccinated on the bare skin on the inner side of the thigh.

3. The needle with the sawn-off eye is dipped in the vaccine mixture and used to scratch the skin. A single firm scratch about 2in. long is sufficient. The eye of the needle should be kept clean and sufficient pressure used to ensure a "take".



The vaccine supplied and a needle with the eye sawn off, which is used for vaccination.

The vaccine must be used within a month from the date of issue and once mixed must be used within 24 hours. If possible, vaccinated animals should be examined 10 days after vaccination, when all vaccinated animals should show typical scab formation at the scarified area.

In all cases of suspected breakdown the following material should be sent to the Chief Diagnostic Officer, Animal Research Station, Wallaceville:—

1. Any unused vaccine.

2. An affected sheep or material from affected sheep.

◆

PRIMARY PRODUCTION MONTHLY REVIEW

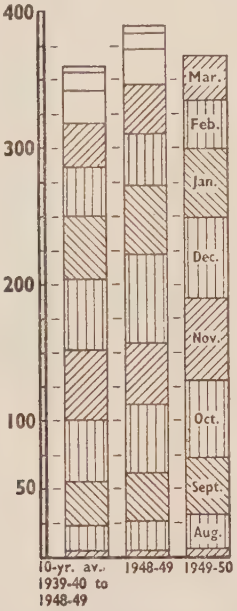
From data supplied by the Statistical Section, Extension Division, Department of Agriculture, Wellington

DAIRY PRODUCE (FACTORY PRODUCTION ONLY)

Season July 1 to June 30: Order of months July to June reading upward in each column

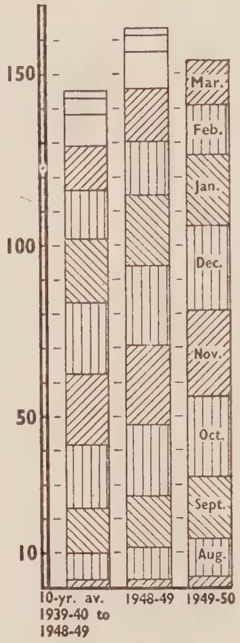
BUTTERFAT USED FOR BUTTER AND CHEESE

Millions of pounds



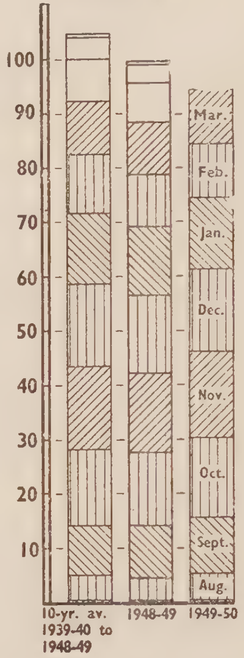
CREAMERY BUTTER

Thousands of tons



CHEESE

Thousands of tons

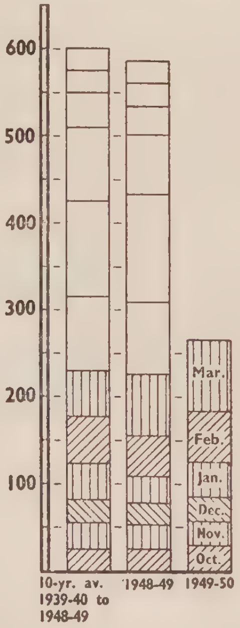


LIVESTOCK SLAUGHTERED AT MEAT EXPORT WORKS AND ABATTOIRS

Season Oct. 1 to Sept. 30: Order of months October to September reading upward in each column

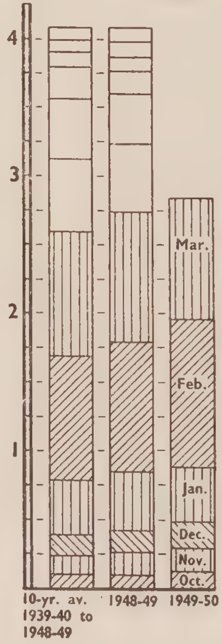
CATTLE

Thousands of carcasses



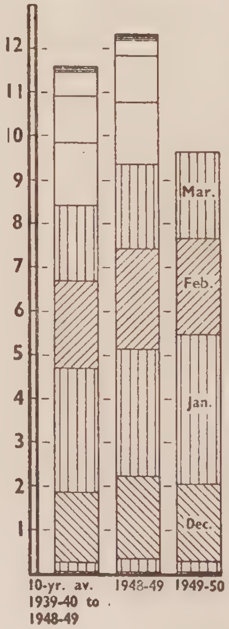
SHEEP

Millions of carcasses



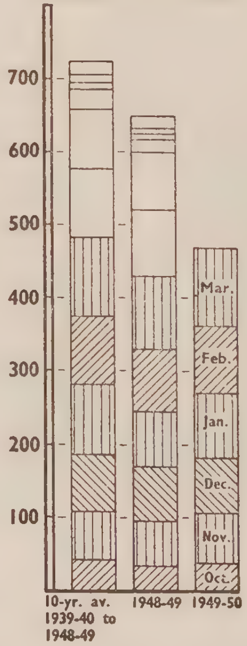
LAMBS

Millions of carcasses



PIGS

Thousands of carcasses



Potash Deficiency in Land in Rotorua District

THOUGH the pumice soils of the North Island were once rich in potash, tests made in the Rotorua district have shown that generally land in the district is now deficient in potash. This article by C. R. Taylor, Fields Instructor, Department of Agriculture, Rotorua, points out the need for this deficiency to be remedied by the application of potash dressings.

Excellent growth on a 3-year-old lucerne stand after two 1cwt. dressings of potash had been applied in the previous 12 months. Before the potash treatment the lucerne was yellow and stunted for 2 years and could not be made to respond to other treatment.

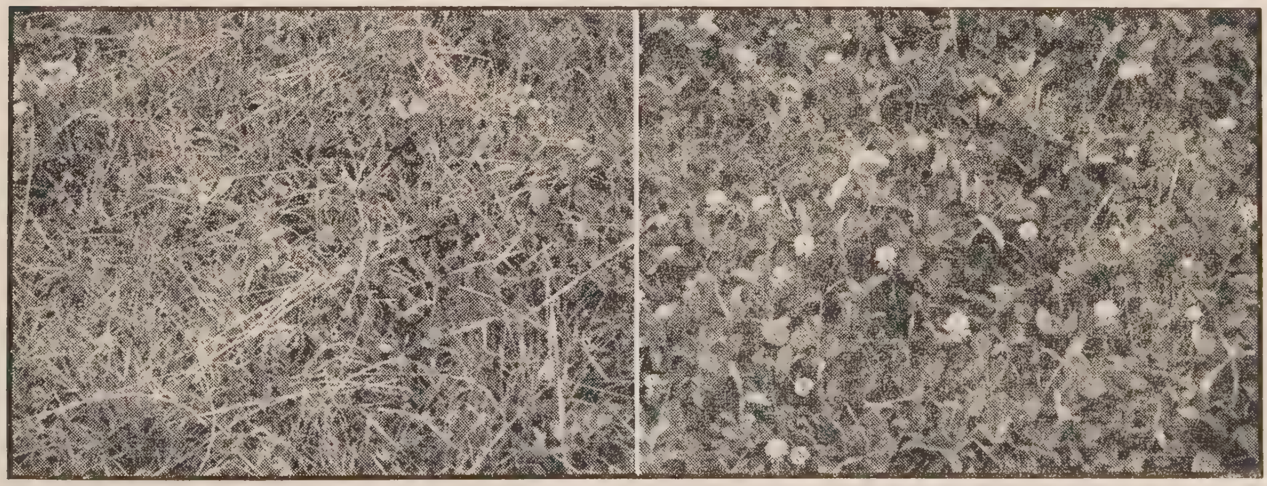
AS far back as 1912, B. C. Aston, a former Chief Chemist of the Department of Agriculture, in discussing in "The New Zealand Journal of Agriculture" the pumice soils and their treatments with phosphates also emphasised the great need for building up the humus content as a pre-requisite to successful agricultural development. In referring to the importance of legumes in this respect he stated: "The dominant plant food required by legumes is potash, and this is present in abundance in the pumice."

Some 4 years later, during the First World War, the same writer in an article dealing with the problem of shortage of potash caused by Allied countries being cut off from the world's main source of supply, Stassfurt, Germany, commented on a statement by Professor Berry, of the West of Scotland Agricultural College, concerning the potash richness of bracken fern ash: "In New Zealand, where fern may grow to a height of 10ft. to 12ft., it seems possible that the yield of ash per acre may be considerably larger [than the amount given by Professor Berry], and on a rich potash soil, such as the pumice lands of the North Island, this fern might prove a more feasible source of potash than seaweed. . . ."

From the above quotations it is clear that by whatever standards were employed 30 and more years ago to measure availability of plant nutrients in a soil, potash was considered to be in ample supply in the pumice soils of the Central Plateau, of which Rotorua forms part. As legumes like red clover grew most luxuriantly on virgin pumice country after the burning off of the bracken fern (rich in potash) and scrub and an application of phosphatic fertiliser only, it can be safely accepted that potash is not, as rightly stated by Aston, deficient under these conditions.

Results of Topdressing Trials

But how long will the pumice country go on producing at a high level without the aid of added potash? Until 2 years ago there was no satisfactory answer to this question, as little thought had been given to it. Pastures under good management that were in poorer condition than would be expected were generally considered to have suffered through wartime economy in topdressing and it was thought that as soon as adequate supplies of phosphates were again available pastures could be restored to their



The effect of potash treatment on clover growth in a sward in the Rotorua district. Left—Weak clover development in young permanent pasture not treated with potash. Right—Vigorous growth of clover on the same sward 3 months after potash treatment.

former condition. However, in many cases this did not happen, and topdressing trials which included a potash treatment and an excellent method of quick testing of soils and plant tissues were used to investigate the trouble.

So far nearly 50 soil samples from different parts of the pumice country of the Rotorua district have been examined for potash and other plant nutrients, and the results from these and those of topdressing experiments and plant-tissue tests have frequently indicated very clearly that potash is no longer in plentiful supply generally, but it is very deficient in many localities.

It is not proposed in this article to deal with the whole of the investigation up to the present time, but rather to acquaint farmers concerned with the problem that lies ahead of them so that steps may be taken to deal with it. As far as it is known at present the districts of Oturoa and Kaharoa and parts of Ngongotaha, Mamaku, Reporoa, and Broadlands are chiefly affected by potash deficiency. Those farms longest under cultivation, some for more than 40 years, are the most deficient and those of more recent development, if at all deficient, are the least so.

Ample Potash in Night Paddocks

Night paddocks on dairy farms, regardless, of the age of property, are almost invariably in good condition and contain ample potash, but fields cut more or less regularly for hay, although frequently receiving more phosphates, have often been found to be in great need of potash treatment. Ordinary day paddocks are usually between these two extremes. Urine contains most of the potash from the food consumed by an animal, which is one reason for the good condition of night paddocks. Hay, on the other hand, can rob a field of more than 1cwt. of potash annually, and if the field is cut frequently for hay for some years and the potash is not fed back on to the paddock, the result can be serious.

A symptom of potash deficiency in pastures which have had good general management and have received regular and adequate dressings of phosphates is a lack of good clover growth and a decided tendency for browntop, sweet vernal, flat weeds, and moss to replace ryegrass and cocksfoot. Lucerne also has been found to suffer severely under conditions similar to those responsible for pasture deterioration. Wherever potash has been applied in such cases at 1cwt. per acre (early spring or early autumn seem the best periods for pasture and spring for lucerne) excellent responses have been obtained in a few weeks. If the extra expense of the potash is a financial difficulty, it would seem perfectly safe either to reduce the amount of normal phosphatic topdressing or withhold it for a year, provided such topdressing has not been neglected in the past.

Investigation is being made to determine the most suitable amount of potash to apply after the initial application, and information on this will be published as soon as it becomes available.

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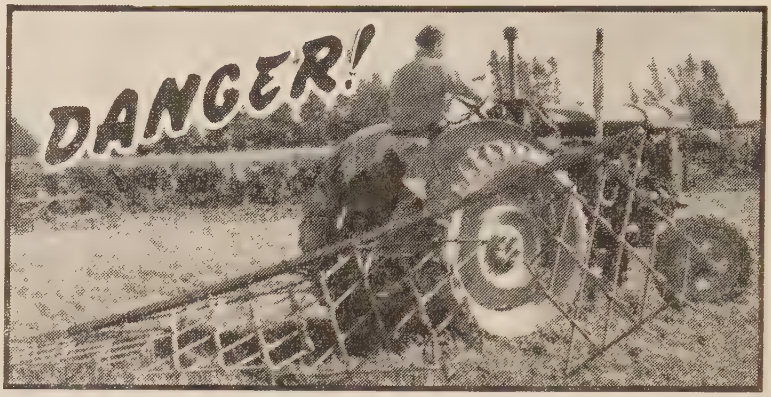


THOUGH present all the year round, the danger of short hitching implements to tractors is more acute in August and September, when South Island farmers are harrowing wheat to aid its tillering and North Island farmers are harrowing pasture to spread sheep and cow dung and fed-out hay that has not been eaten by stock. When sharp turns are made with short-hitched sets of harrows, the bar engages on the tyre and rides up the wheel, as in the illustration, so that the driver is in danger of severe injury. To avoid this danger there should be fitted between the harrows and the tractor a length of chain or wire rope long enough not to foul the rear wheel when sharp turns are made. Short-hitched implements are more likely to ride up the wheel of a steel-wheeled tractor, especially one fitted with A grips instead of spade lugs. This danger is also present to a less degree with trailer-drawn implements with a short drawbar, though contact between the rear wheel or crawler tracks and the drawbar more usually results in damage to the implement or the tractor tyre than in a human injury.

Exercise care when sharp turns must be made with a tractor and fit longer hitches where necessary.

—*C. J. CROSBIE, Farm Machinery Instructor,*
Department of Agriculture, Christchurch.

METEOROLOGICAL RECORDS FOR MAY

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	60.8	+ 5.8	72.0	43.0	9.56	22		2.03	21	96.4
Auckland	160	61.0	+ 4.4	70.2	47.1	2.04	18	— 2.94	0.52	10	122.0
Tauranga	10	58.4	+ 5.1	70.1	37.1	12.26	18	+ 7.42	4.46	15	113.5
Ruakura	131	55.4	+ 3.7	71.2	27.9	1.30	11	— 3.28	0.32	18	104.0
Rotorua	980	54.9	+ 5.2	68.0	32.0	6.50	15	+ 1.04	1.74	12	81.2
Gisborne	12	56.8	+ 4.0	72.1	38.7	4.18	13	— 0.31	1.23	12	114.9
New Plymouth	160	57.4	+ 4.0	69.0	41.5	2.59	14	— 3.30	0.95	15	108.1
Napier	5	56.7	+ 4.3	76.7	38.2	2.46	10	— 0.75	1.37	12	128.3
Taihape	2157	52.6	+ 6.1	69.9	34.0	0.94	10	— 2.39	0.21	14	
Wanganui	72	56.3	+ 4.4	75.0	33.7	0.98	11	— 2.25	0.20	5	134.8
Palmerston North	110	54.4	+ 3.9	74.0	31.8	0.52	9	— 2.88	0.17	12	127.4
Waingawa	350	53.0	+ 4.0	72.9	28.0	2.16	9	— 1.84	0.83	13	115.9
Wellington	415	54.6	+ 3.4	70.2	38.5	1.43	15	— 2.91	0.30	12	104.7
Nelson	24	55.1	+ 4.6	67.7	37.9	3.61	13	+ 0.46	1.00	15	115.7
Blenheim	12	53.8	+ 3.8	71.8	31.8	1.64	11	— 0.66	0.55	26	143.5
Hokitika	12	53.6	+ 5.4	70.0	33.8	15.50	21	+ 6.05	4.34	26	94.5
Hanmer Springs	1225	49.0	+ 4.5	76.0	20.5	2.09	11	— 2.51	0.45	5	92.3
Christchurch	22	51.1	+ 3.6	79.1	31.6	1.03	7	— 1.85	0.64	13	88.9
Ashburton	323	49.6	+ 3.7	75.0	28.0	1.39	11	— 1.10	0.44	17	90.9
Timaru	56	49.2	+ 2.5	71.4	30.0	0.80	9	— 0.71	0.51	17	107.6
Alexandra	520	44.8	+ 1.9	66.2	19.2	0.92	8	— 0.01	0.80	25	104.7
Taieri	80	47.6	+ 1.7	74.5	24.7	0.95	6	— 1.35	0.47	17	94.8
Invercargill	32	47.0	+ 1.3	68.0	25.0	1.47	15	— 2.73	0.40	16	100.8

Premium on Porkers

THE announcement by the Minister of Agriculture of the adjustment of the official pig-meat price schedule to provide for a premium of 1d. per pound on porker-weight carcasses was the outcome of negotiations initiated by the National Pig Industry Council. The policy underlying this decision and the adjustments in the production system which it is hoped it will produce are dealt with in this article by A. Longwill, Superintendent of the Pig Industry, Department of Agriculture, Wellington.

FOR the first time since 1941, when a policy of increasing baconer production for export was embarked upon as part of the war effort and a premium for baconer-weight carcasses was instituted, the situation has changed and an incentive to farmers to produce a higher proportion of porkers has been provided by the payment of a premium on porker-weight pigs. The premium in favour of porkers, which operated from May 15, is 1d. per pound throughout as against the corresponding grade in baconer-weight pigs.

What is the reason for this change of policy in regard to pig meat and how best can its objectives be achieved?

Basis of Policy

Before the war, when New Zealand's pig production was about 1,000,000 carcasses, porkers accounted for 600,000 carcasses and baconers for 400,000. The premium in favour of porkers under free marketing conditions was usually about ½d. per pound, and under these conditions producers found it financially attractive and convenient, under a feeding system involving dairy by-products, to turn more than half the total pigs off as porkers.

In pre-war years New Zealand exported up to 30,000 tons of pig meat annually, porker and baconer weights accounting for almost equal shares of the total tonnage. However, the porkers suited the highest-price markets of London and the south of England much more nearly than did the baconer carcasses, which were used mainly in Scotland and the north of England. The goodwill built up on the Home market by New Zealand dairy-fed porkers was such that it can be of considerable importance in any effort to rebuild exports on a sound basis.

[*Neuline Film Studios Ltd. photo.*

Farmers should plan to have an extra sow mated as soon as possible for November farrowing.

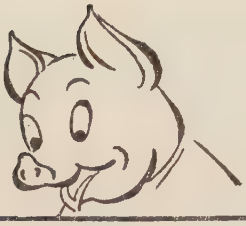
That this is necessary is indicated very clearly by recent export figures. New Zealand's pig-meat exports last year were only 8841 tons, 5749 tons of baconers and 2227 tons of porkers, together with 865 tons of cuts. Most of the baconers were heavy, overfat pigs judged by normal market standards. The average weight of the porkers also tended to be heavier than that normally in greatest demand. It must be remembered that the acute fat shortage in Britain has been largely overcome and the consumer cannot be expected to pay 2s. or more per pound for pig meat which is more than half fat when cooking fats can be bought for 8d. per pound. The result must be that the consumer will become more selective, particularly as far as degree of fatness is concerned. All countries supplying the market are becoming more conscious of this, and those which take the first steps to supply what will be taken up most readily will reap their reward. The overfat baconers exported at present are only harming New Zealand's reputation for pig meats on the Home market.

Porkers do not, on the whole, have the same tendency to overfatness as baconers. However, though porkers are likely to be of acceptable quality the quantity being exported is exceedingly small and British people are seldom able to buy pork. The average annual consumption of fresh pork has fallen to 1lb. per head, or less than a tenth of pre-war consumption.

It is estimated that Britain will have sufficient bacon by 1952 and, as the quality of New Zealand supplies is not, on the whole, as good as that from the other supplying countries, it is obvious that it is wisest for New Zealand, as far as the export market is concerned, to concentrate on porker production.

Rebuilding the Market

As pork is a fresh meat, the market for it is not likely to be saturated as early as the bacon market, and more time is therefore available to re-establish a market for porkers. To do this



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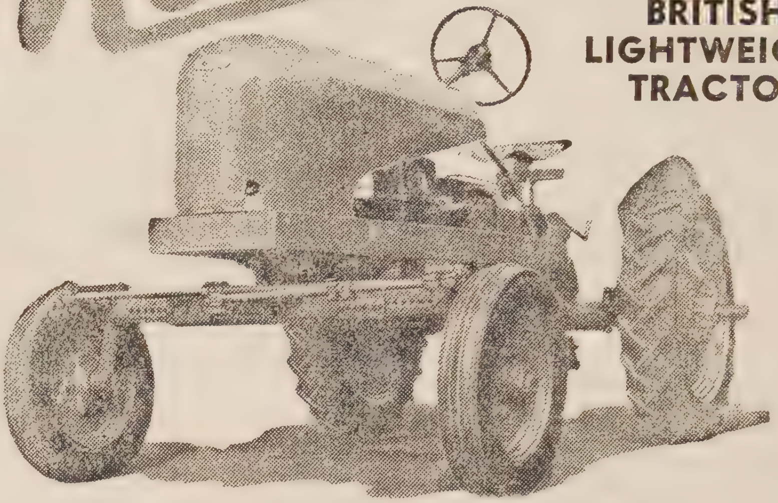

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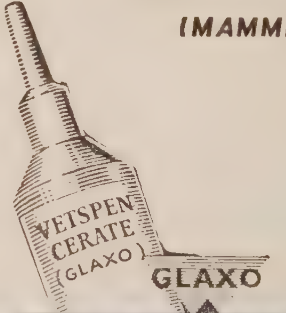

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there are three fundamental requirements:—

1. Consistently high quality in relation to price.
2. Quantity sufficiently substantial to interest the bulk or wholesale buyer.
3. Regularity of supply.

The quality of New Zealand pork in the past earned the goodwill of the British consumer, but an effective grading system giving incentive to the production of the best-quality carcasses finished at the most desirable weights (70 to 90lb.) is necessary to improve present quality and preserve goodwill.

In regard to price there is little to fear, because New Zealand pork is still the cheapest that Britain can buy. In view of reports that lack of purchasing power threatens to curtail increased consumption of meat in Britain, pig producers in New Zealand may be thankful that the price they have received for pig meat has enabled it to go into consumption without having to be subsidised by the British Government. Withdrawal of subsidies would mean that countries whose costs have risen so that they cannot produce pork at a price at which it will be consumed will find great difficulty in competing on the British market until their cost structure is adjusted.

The quantity of pork available for export must be increased quickly if sufficient is to be forthcoming to interest buyers once the "buyers' market" for pork returns. This is at once evident if the figures already quoted, showing the decline in exports since the prewar period, are studied. That exports of pork can be increased quickly without decreasing the total weight of baconer carcasses produced will be shown later. What is required is for producers to take the long-term view regarding future market prospects and to be willing to organise and work for their own future security.

Production of more than half the total pigs as porkers is well suited to the dairy by-products feeding system.

Continuity of supply to the British pork market can be achieved by dovetailing frozen-pork supplies with fluctuations in local fresh-pork supplies. Traditionally, British people did not eat pork "when there was no R in the month"; that is, in the warmer months. However, just before the war New Zealand lean, dairy-fed pork had broken down tradition and was actually going into consumption during the whole 12 months. This can be achieved again. It does not mean that pork killings must be uniform throughout the year, and the fact that New Zealand pork exports must be frozen may be regarded as an advantage. Normal fluctuations in supplies of pig foods largely dictate the level of killings throughout the year, and the proportion of baconers to porkers killed is a result of the interaction of the number of sows farrowed, the dates of farrowing, and the quantity of dairy by-products available throughout the season.

[*B. Snowden photo.*

Porkers should be finished at 70 to 90lb. carcass weight.

Implications of Policy

Under a price schedule which provided a uniform rate per pound for all pigs from 60 to 175lb. dressed weight there was an incentive to reduce sow numbers to a minimum, to produce fewer pigs, and to take these to as high a weight as practicable. The basis of payment, coupled with scarcity of materials for building and shortage of labour, led many farmers to dispose of sows and buy just sufficient pigs to cope with the surplus skimmed milk or at least such a proportion of it as to reduce its "nuisance value" to the minimum. Prices of weaners and stores reached record figures in spring and little real profit could have been made out of bought-in pigs if losses and labour costs were taken into consideration, even if they were taken to top weights. Besides ruining quality the fattening of bought-in pigs has resulted in inefficient use of the feed

PREMIUM ON PORKER PRODUCTION . . .

supply and a fall in the sow population to a critically low point.

More Sows the First Step

Breeding sows, at 68,300, at present are at the lowest point they have been since just before the depression of the early 1930's. Although food supplies have shrunk, the present number of sows, under existing management, is inadequate to supply the number of pigs required to cope effectively with the spring flush of dairy by-products. Surplus food may be simply tipped down the drain or waste may take the less-obvious form of over-feeding, which, if it does not actually undermine the health of the pigs and cause losses, produces overfat pigs that in normal times are not wanted.

If the policy of encouraging pork production is to succeed, it is obvious that to deal with the flush of dairy by-products effectively more pigs must be kept. This can be achieved by better use of the existing number of sows, by an increase in the number of sows, or by a combination of the two. Provided the necessary accommodation for farrowing is made available, an increase in sow numbers will provide the quickest means of increasing pig numbers. An increase of 10 per cent. in the number of breeding sows each year for the next 3 years at least should be the minimum aimed at. The soundest policy for the individual farmer usually is to breed all his own requirements. Where skimmed milk is available the farmer should aim to keep 1 sow for every 10 cows or where whey is available 1 sow for every 20 cows.

Baconers in Summer: Porkers in Autumn

The first result of having a larger number of pigs in spring should be that more baconers, but of lighter individual weights than are common today, should be produced. As long as there is adequate milk or whey most of the pigs should still be taken on to baconer weights. Instead of taking these to the top weights which have become common in recent years, with unfortunate repercussions on quality, farmers should recognise that the trade is becoming more selective and should plan to finish baconers at between 200 and 220lb. liveweight (150 to 160lb. dressed weight). Such pigs as have to be finished as porkers during spring or the flush period should be sorted out on type, and the shorter, earlier-maturing type pigs sent away as porkers, preferably at 70 to 90lb. When food supplies are falling off in autumn most of the pigs will naturally be finished at porker weights. It is good farm practice to build up reserves of feed for the herd in case of drought, and the same applies to feed for pigs. If this is done there should be no difficulty in getting the second-litter pigs finished as porkers in the weight range already mentioned.

The aim of getting two litters away from each sow within the one dairying season can be achieved best by adjusting farrowing dates carefully to fit in with the feed supply. To do this sows should farrow in May-June and again in November-December.

At this stage farmers should plan to have an extra sow mated as soon as possible for November farrowing. The sow should be selected on the basis of knowledge of the prolificacy and mothering and milking ability of the strain from which she comes, as well as of growth rate and carcass type. If such information is not available, it would be advisable to save a gilt from the best sow in the herd, provided this does not mean she has to be mated to her own sire. This will give an extra litter of porkers in the season and start the breeding cycle at the right time so that the supply of pigs for the following spring should be more adequate.

Adequate Housing

Many farmers farrow sows in July and August when weather is usually far worse than it is in May and June. As most losses in pigs occur at or or shortly after farrowing, early winter farrowing is preferable if only because better weather is likely to be experienced then than later. However, suckers and weaners must be housed during cold and wet weather. Farrowing houses with concrete control yards attached and facilities for a run-out on grass when this is dry are necessary to get the best results from winter farrowing. Undoubtedly many losses occur (probably a quarter of all pigs born in winter die) which could be avoided if better control was possible at farrowing time and a little extra care was taken at that time. That it is worth while is shown by the results obtained in many cases where a change-over to earlier winter farrowing has been made or where the importance of extra care at farrowing has always been appreciated.

Higher Production of Porkers

A policy of producing a higher proportion of porkers provides a more flexible system of production which fits the dairy by-product feeding system admirably. It must be emphasised that what is sought is not a change to porker production exclusively, or even at this stage predominantly, but the restoring of porker killings to a figure approaching parity with baconer killings. This policy should provide the most profitable basis for the use of dairy by-products as pig feed.

The steps necessary to implement the plan are as follows:—

1. Increased home breeding.
2. Very careful selection of breeding sows; get two litters from each sow each year.
3. Keep at least 1 sow to 10 cows if skimmed milk is being used and 1 sow to 20 cows if whey is being fed.
4. Farrow sows in May-June and November-December.
5. Accommodation must be adequate, and if necessary increased, with special reference to winter farrowing quarters.
6. As far as is practicable provision must be made by the saving of home-grown crops, by preserving curd, or by buying in food to ensure that the food-supply position is satisfactory at all times.
7. Use meals for sows and young pigs, not for finishing, except in an emergency to get pigs over the 60lb. mark.
8. Winter-born pigs will require concentrates until the milk supply is adequate, but will still be cheaper than bought-in pigs; most will go off as baconers during the flush. If all winter-born pigs cannot be taken to baconer weight (about 150lb.), it may pay to pick out the porker types at the right weight (70 to 90lb. carcass weight) for sale in spring. Produce as few pigs of intermediate weights (100 to 130lb.) as possible.
9. As the market is becoming progressively more selective, the breeding and feeding aspects of producing top-quality carcasses must be kept in view.

DAIRY PRODUCE GRADED FOR EXPORT

THE following figures showing quantities of dairy produce graded for export during May and for the 10 months ended May 31, 1950, with comparative figures for the same month and 10-monthly period of 1949, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER—

Period	Creamery	Tons Whey	Total	Percentage inc. or dec.	Tons Total in store at end of mth.
May, 1950	2,115	139	2,254	—	14,777
May, 1949	4,079	122	4,201	—	25,193
Increase or decrease	—1,964	+17	—1,947	—46.346	—10,416
For 10 months ended 31/5/50	140,435	2,864	143,299	—	—
For 10 months ended 31/5/49	141,129	2,605	143,734	—	—
Increase or decrease	—694	+259	—435	—0.302	—

CHEESE—

Period	White	Tons Coloured	Total	Percentage inc. or dec.	Tons Total in store at end of mth.
May, 1950	4,742	973	5,715	—	20,884
May, 1949	5,108	300	5,408	—	16,712
Increase or decrease	—366	+673	+307	+5.676	+4,172
For 10 months ended 31/5/50	77,270	21,509	98,779	—	—
For 10 months ended 31/5/49	88,092	5,053	93,145	—	—
Increase or decrease	—10,822	+16,456	+5,634	+6.048	—

If these figures are converted into butterfat equivalent, there is an increase of 1.058 per cent. in butterfat graded for the 10 months as compared with the corresponding period of the preceding season. It should be noted that the above figures refer only to butter and cheese graded for export, and that owing to diversions which may take place from time to time, they are not necessarily a true indication of production trends.

MECHANICAL AIDS TO IRRIGATION

A SERIOUS handicap to the full use of irrigation water is the additional labour required for spreading water during normally busy periods on the farm. An answer to this problem may be found in mechanisation, especially if the method is simple and instruments can be made in the farm workshop. This article by W. A. Lunn, Assistant Fields Instructor, Department of Agriculture, Alexandra, describes two such methods which have been successfully operated by a farmer in Central Otago.

EFFICIENT irrigation in areas of low rainfall depends upon control of available water with a minimum of wastage of both time and water. Two ingenious control methods involving the use of automatic gate releases to divert the water into different races or border checks have been employed successfully by Mr. F. Middleton, of Northburn Station, near Cromwell.

In one method control is effected by using an alarm clock, which automatically shuts off the water at a given time by releasing a wooden gate, the time of release varying according to the setting of the alarm; in the second method the gate release is operated by a paddle wheel and sets of single-screw worms and worm wheels, the time of release of the gate being regulated according to the number of revolutions of the paddle wheel.

For ease in setting up the mechanism and to prevent scouring, wooden gates in concrete seatings have been installed at all points along the head distributing races wherever water is diverted into the border checks.

Control by Clock

The clock as shown in the illustration on this page is connected to a trip by a strip attached to a miniature windlass, which replaces the alarm winder, the whole mechanism being bolted to a metal base, and secured by a thumb screw to one of the bolts holding the metal cross-bar of the concrete seating. The trip, as shown in the diagram below, is built in 4 sections and the actual movement to release the gate is transmitted from the clock in three combined motions. As the windlass J revolves, tightening the strap, lever A is drawn upward, turning on the pivot B to cause a downward pressure of the foot C on the top of trigger sleeve D, which is free to slide on the support bar E. As trigger sleeve D moves downward on support bar E lugs on the gate stop F are released from slots in sleeve D; the weight of the gate on F causes F to swing outward and down on pivot G allowing the gate to drop. As pivot G is at the bottom of support bar E, support bar E with trigger sleeve D can swing sideways round pivot H to allow the gate stop F to clear the vertical line of travel of the gate pin I. The hole in trigger sleeve D for the pivot pin H is slotted to permit the sleeve D to move downward on the support bar E which is also supported on pin H.

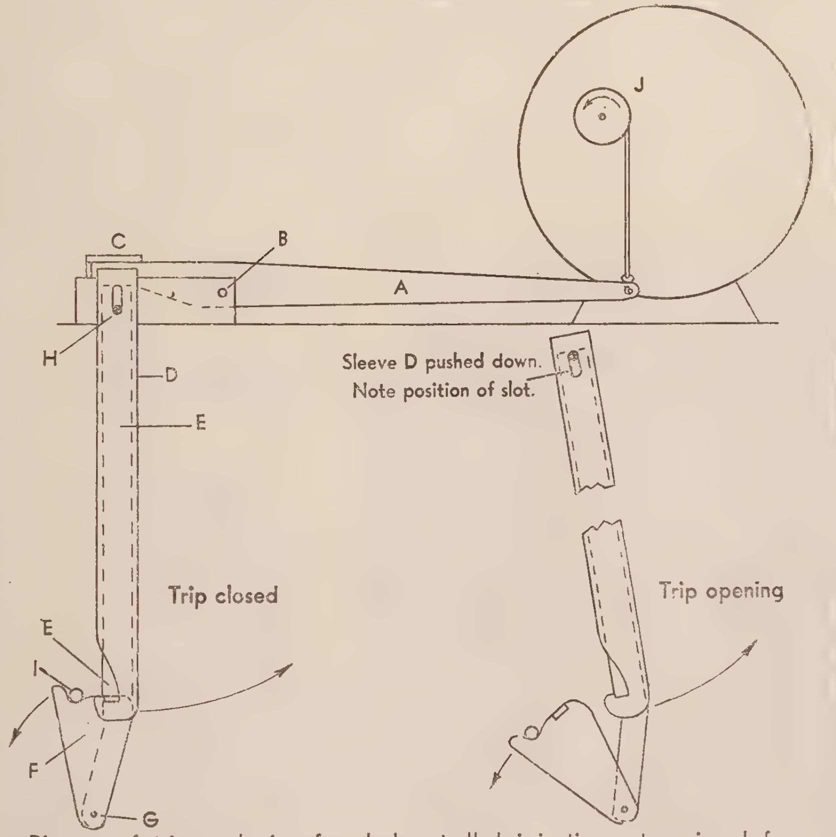


Diagram of trip mechanism for clock-controlled irrigation gates, viewed from back. A—Lever. B—Pivot. C—Foot which exerts downward pressure on trigger sleeve. D—Trigger sleeve. E—Support bar. F—Gate stop. G—Pivot. H—Pivot. I—Gate pin. J—Windlass, which replaces alarm winder.

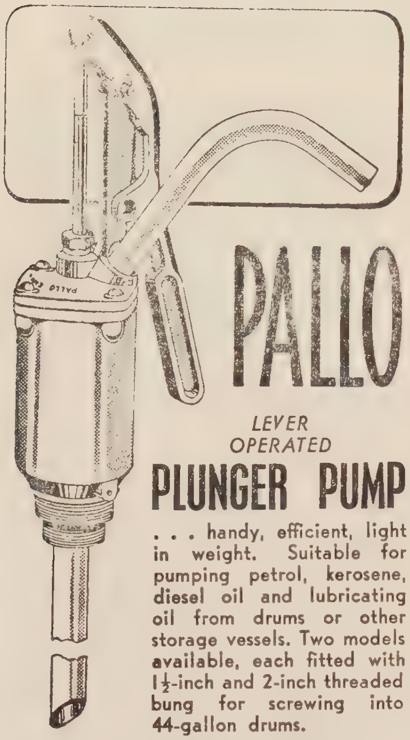
Alarm clock trip used to close check board in an irrigation race.

The gate is dropped into a concrete seating closing off the water and diverting it into a new check.

Control by Paddle Wheel

The second mechanism is driven by the water in the race. The framework has two hooks which are fitted over the cross-bars of the gate, and the other end is supported by a single steel leg. The height of the paddle wheel, which was made from a bicycle wheel, can be varied according to the amount of water in the race by shifting a peg in the hole in the steel leg.

The long rod A shown in the illustration at the top of page 29 revolves slowly until the attached lever B strikes a crank C releasing a catch similar to the one used with the clock. Three sets of single-screw worms and worm wheels (see diagram on page 29)



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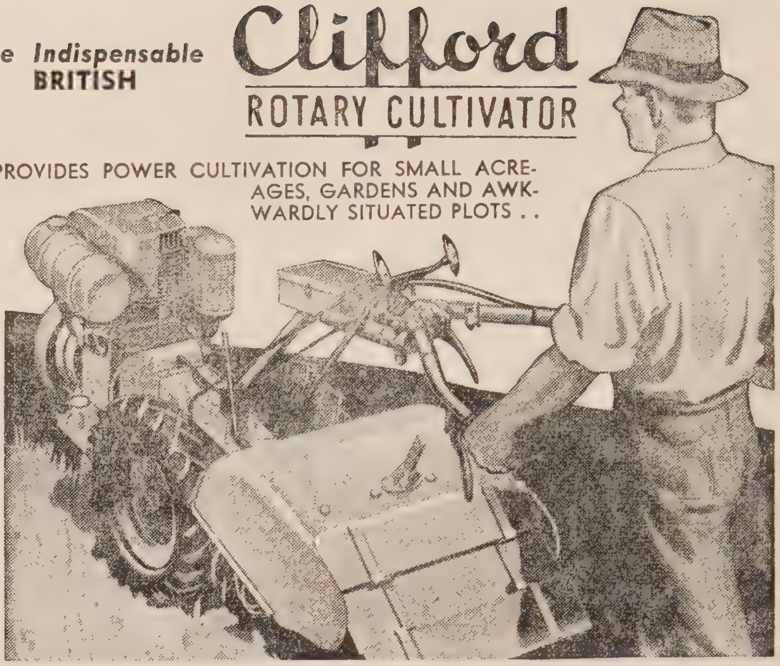

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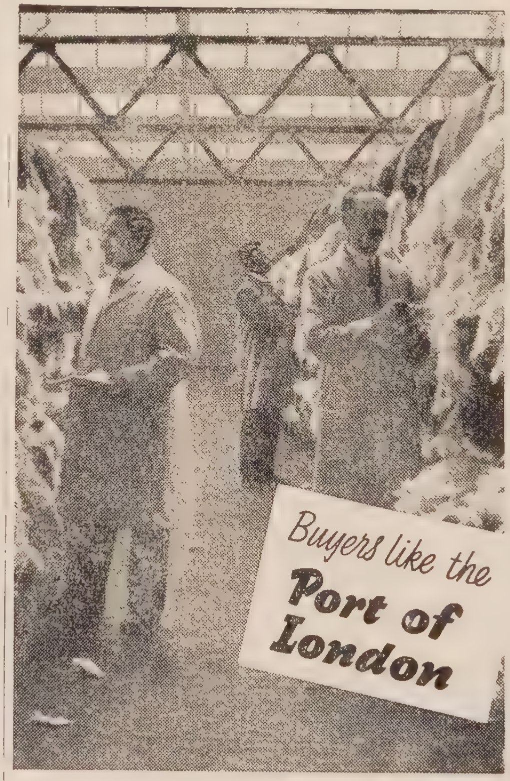

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have been used to reduce the revolutions of the wheel to the very slow revolution of the driving rod and trip lever—each worm wheel has 35 teeth and the speed of the paddle is therefore reduced to 1/35 for each set of worm and worm wheel (from revolutions per minute of the paddle to hours per revolution of the driving rod and trip lever).

The time taken for the trip lever to complete one revolution varies according to the speed of the water, and the disc illustrated on this page is used to determine time settings: Each circle on the disc represents a different speed and is marked in hours. A section of the disc has been removed to allow it to be passed over the driving rod A and alongside the lever B. In setting the mechanism, the speed of the paddle in revolutions per minute is determined, the set screw of the trip lever B is loosened and the disc placed over the driving rod with the open part in line with the crank C. Then without moving the disc, the trip lever is moved back round the disc to the required hour setting on the appropriate revolution circle. The set screw is then tightened and the mechanism set in motion to release the gate at the required time.

Materials Used

The construction of the mechanism using the paddle, all the parts of which were made on the farm, called for considerable skill and a knowledge of mechanics. The paddle was made from an old cycle wheel and the worm wheels were cut from valves of a Model T Ford engine.

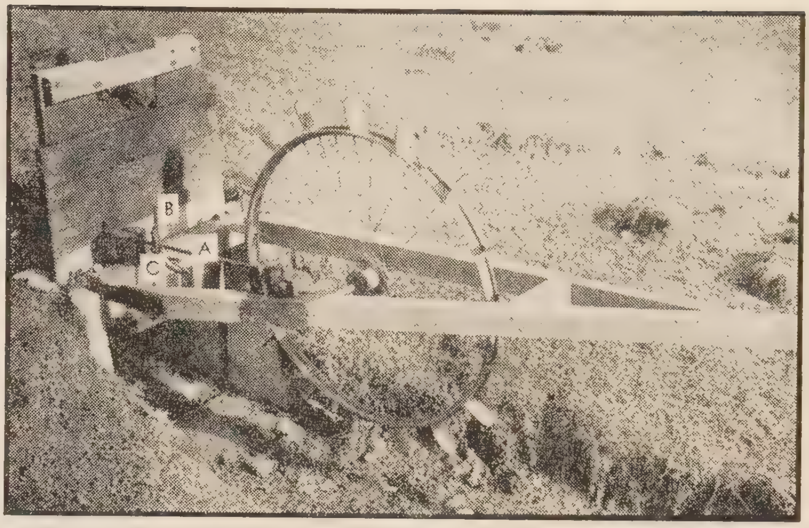
The clock-type control mechanism is more simply constructed and the equipment could be used to advantage on many farms. The tripping mechanism is simple and many variations are possible.

Time Saved at Busy Periods

Mr. Middleton has brought about 120 acres under irrigation and the use of the devices described has assisted him considerably. Instead of having to leave at regular intervals throughout the day during busy periods such as harvesting or shearing to divert water he has now only to set the control equipment in the morning and evening and make an occasional check-up. The paddle-wheel mechanisms, which have up to 36-hour settings, are used on the main races and alarm-clock assemblies on the head races, where the water requires to be diverted more frequently.

The use of the equipment described has not made it necessary to erect additional dikes and ditches, other than those required for normal efficient control of irrigation water in border dikes. The time saved by eliminating the continual patrolling of the property during the irrigating season has been an important factor in increasing the area of irrigated ground on Mr. Middleton's farm and, in turn, the carrying capacity of the property.

PADDLE-WHEEL MECHANISM



The paddle-wheel mechanism. A—Driving rod. B—Lever. C—Crank.

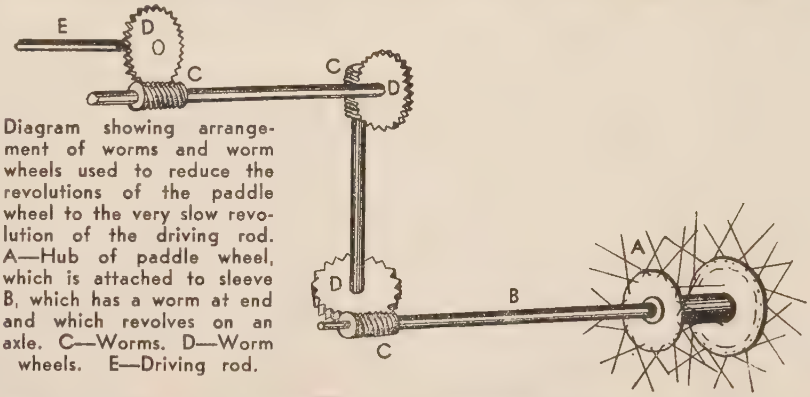
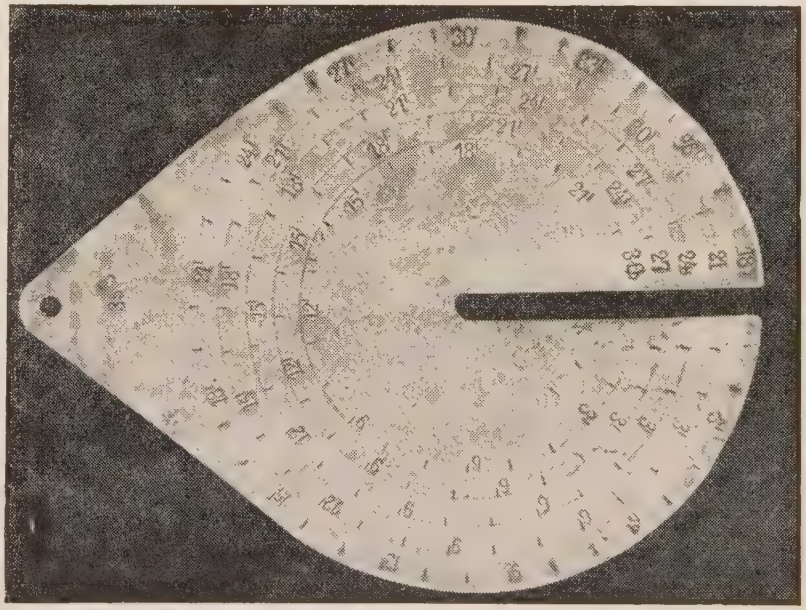


Diagram showing arrangement of worms and worm wheels used to reduce the revolutions of the paddle wheel to the very slow revolution of the driving rod. A—Hub of paddle wheel, which is attached to sleeve B, which has a worm at end and which revolves on an axle. C—Worms. D—Worm wheels. E—Driving rod.



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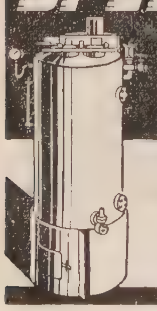

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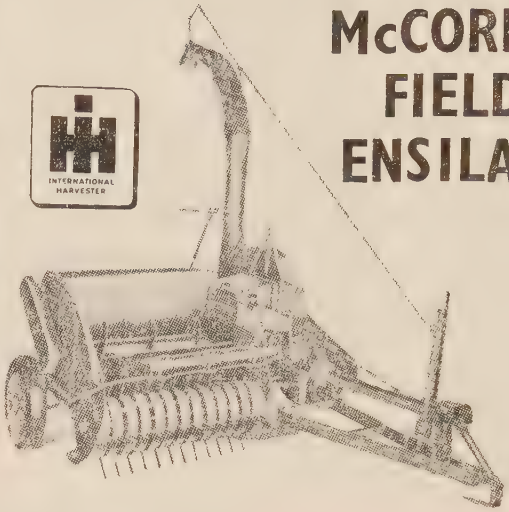

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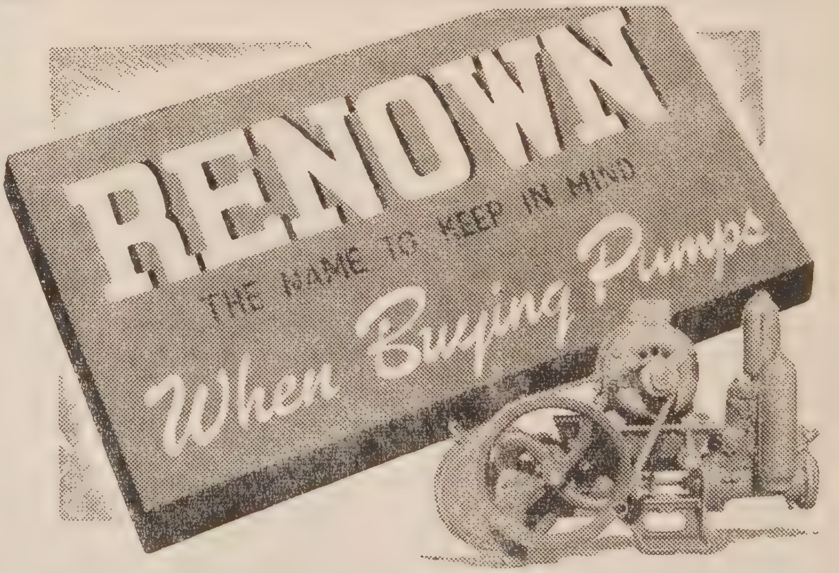

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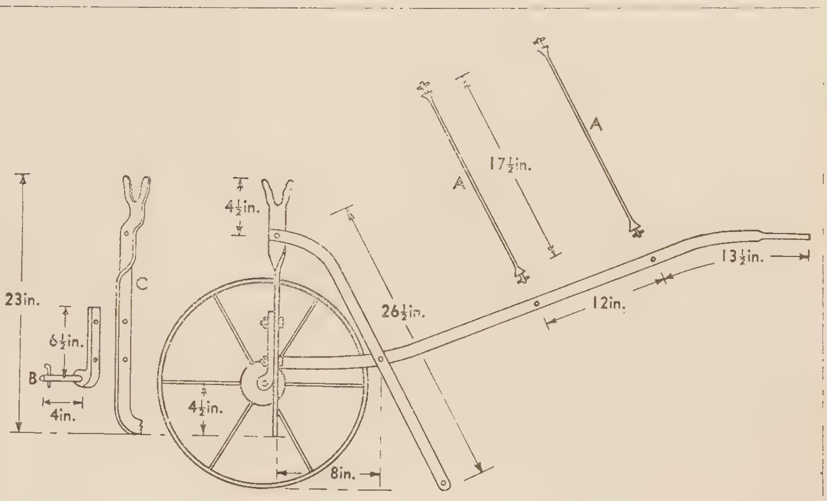
Skimmed-milk Disposal from Small Farm Dairies

WHERE mechanical means are not available the disposal of skimmed milk from small dairies can become burdensome to the farmer and a source of contamination of dairy produce. This article by E. Sigley, Farm Dairy Instructor, Department of Agriculture, Rangiora, describes a convenient device which provides sanitation and reduces the labour involved in the manual removal of this by-product from the dairy.



Component parts of conveyer. A—Cross stays. B—⅞in. axle. C—Container support.

THE disposal of skimmed milk from the farm dairy and its conveyance to the piggery, which is required by law to be 50yds. distant, are matters which must be faced by all dairy farmers who separate cream, and the amount of work involved depends on the method employed and the quantity of skimmed milk to be handled.

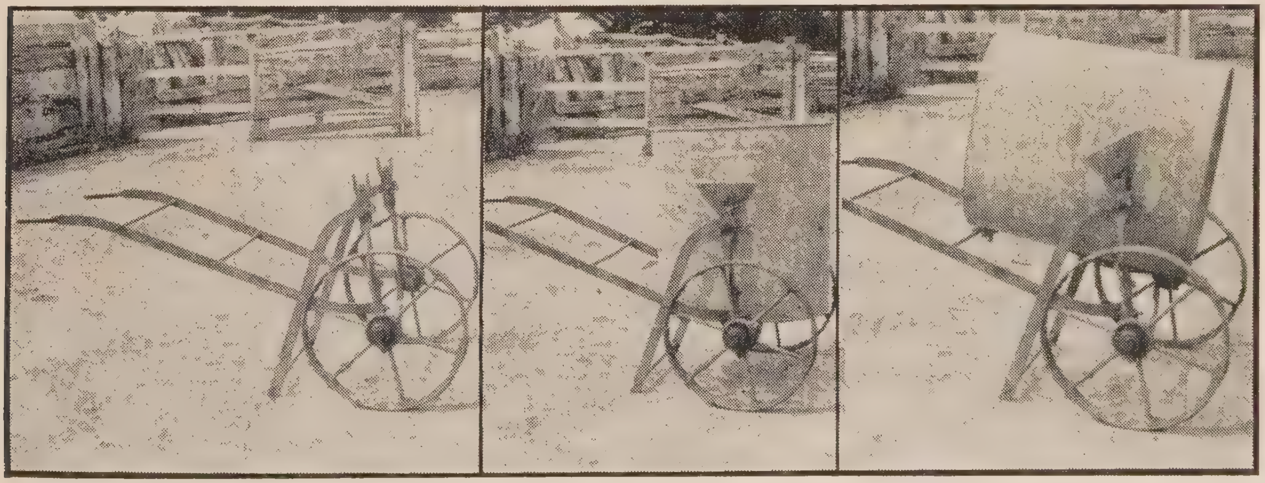
In all farm dairies, both large and small, a sanitary means of skimmed-milk disposal is essential. Any method of disposal which entails the holding of sour and fermented skimmed milk, or its sour and unclean containers, at or too close to the dairy will cause intense contamination of milk and cream, particularly during the warm months of the main producing season. The quality of the dairy produce is affected by the bacteria of fermentation, while flavour is affected by the produce absorbing the unclean smell of such conditions.

The majority of farm dairies are equipped with milking machines or have motive power for driving separators, and wherever such power is available the skimmed-milk pump should be utilised. Such an installation not only provides the most sanitary means of skimmed-milk disposal, but it completely removes the labour factor attached to it. This means of disposing of skimmed milk is recommended wherever possible, but in the small percentage of hand dairies at which the herd is too small to warrant the installation of motive power, some alternative means must be employed.

The common methods of collecting skimmed milk in iron drums and wooden barrels located close to the separator room and of collecting the skimmed milk in buckets at the separator and transporting it manually to a distant receptacle are quite unsatisfactory and usually insanitary. The utmost care in the cleaning of the iron drums used in the first method does not give satisfactory results, because the acidity of the skimmed milk affects the metal to such an extent that it becomes very porous and gives off a sour, unclean smell despite the best efforts of cleaning. A further objection is that the aggregation of skimmed milk in containers close to the separator room means that the skimmed milk must be lifted from this point and carried or carted to its destination, and in this process the spillage which results causes the air to become contaminated too close to the dairy and dairy produce.

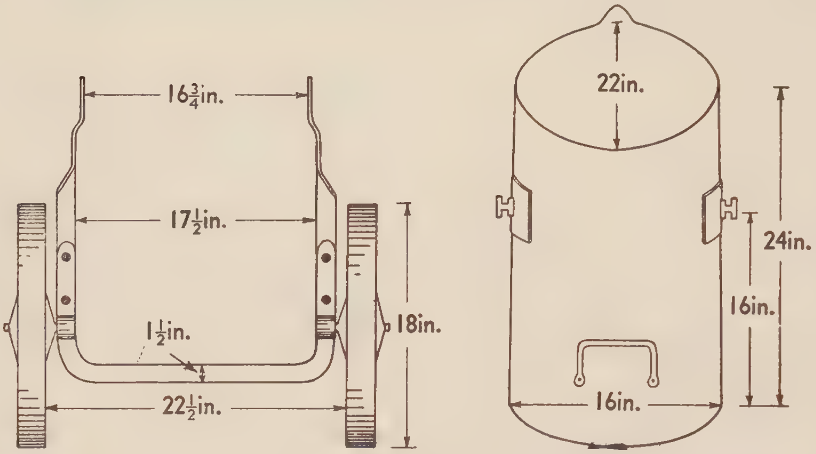
The second common method of collecting skimmed milk in buckets as it leaves the separator not only requires considerable labour but has the unsatisfactory effect of causing damage to the concrete floor of the separator room by the constant wear of buckets and more particularly by the spillage of skimmed milk, the acidity of which penetrates and ruins the concrete surface.

A very satisfactory device for the handling and disposal of skimmed milk from small dairies has been devised



Left—The conveyer. Middle—The conveyer with the container in the upright position. Right—The container tipped forward.

SKIMMED-MILK DISPOSAL



Left—End view of conveyer. Right—Container.

and used in some districts of the South Island for several years. By its simplicity and convenience it reduces the labour involved in skimmed-milk disposal to a minimum, and it is the most sanitary means of disposal in those cases where the installation of a skimmed-milk pump is not warranted.

Description of Conveyer

The device consists of a **22-gauge** galvanised-steel drum of a **capacity of** from 20 to 40 gallons fitted to **a wheeled** conveyer as illustrated. **The frame of** the conveyer is made of **1½in. x ⅜in.** flat iron fitted to wheels of approximately 18in. in diameter. While being filled and during transport the container is held in an upright position on the frame and as its weight is supported at a central point by the rod-and-socket method, the container can be tipped as required and any quantity of liquid can be conveniently removed from the container.

The container provides the utmost sanitation in manual skimmed-milk disposal with a minimum of labour, and provided the container is emptied immediately after each milking and washed and scalded similarly to the utensils of the dairy, it may be wheeled into the separator room and filled directly from the separator. Thus any spillage of skimmed milk on the concrete floor is avoided and the life of the concrete is extended.

A further point in favour of this device is that the skimmed-milk container can be conveniently removed and a detachable wooden platform fitted to the conveyer, providing a simple and convenient wheeled vehicle for conveying the cans of cream manually from the dairy to the roadside for delivery.

The usual dimensions of the conveyer and container are shown in the sketch on this page and many farmers will be able to have the device made up to their requirements. Its use is recommended for small dairies to provide greater sanitation and to reduce the labour involved in the disposal of skimmed milk.

☆

New Officers of Y.F.C. Federation

MR. A. O. LLOYD, Western Bay of Plenty, was elected Dominion president of the New Zealand Federation of Young Farmers' Clubs at its 16th annual general meeting, held at Christchurch on June 14 and 15. The new vice-president is Mr. C. A. Macdonald, North Canterbury, and Mr. W. F. McLaren, Masterton, was re-elected grand patron. Mr. Lloyd is a past chairman of Auckland Council, and Mr. Macdonald a past chairman of Canterbury Council. Both have been prominent in Y.F.C. affairs for a number of years.

Members elected to represent the movement on other bodies were Messrs. O. J. Osborne, Christchurch (Federated Farmers' Dominion Council), J. V. McIntyre, North Taranaki (National Pig Industry Council), and W. J. Symes, Mid-Canterbury (New Zealand Federation of Country Girls' Clubs). Mr. K. J. Holyoake, Minister of Agriculture, and Mr. D. G. McLachlan, Masterton, were elected patrons.

Present at the official opening were Mr. Holyoake and Mrs. Holyoake and Sir Ernest Andrews, Mayor of Christchurch, who welcomed delegates to the city. In his address before declaring the meeting open Mr. Holyoake briefly reviewed the growth of the Y.F.C. movement, recapitulated its main aims and showed how these were being attained, and recalled his own association with the federation. Mr. Holyoake reminded delegates that not only were they the farmers of tomorrow, but that they were also the farm leaders of tomorrow.

National Memorial

The attainment of the federation's goal of £20,000 for the national Y.F.C. memorial fund was reported, the sum in hand at the date of the meeting being £20,565, 9s. 4d.

The suggestion of a national memorial to commemorate those members who lost their lives in the Second World War was first mooted in 1942 and the raising of the necessary money has been an endeavour of the organisation for several years. The next step now will be the provision of special buildings at the agricultural colleges (Massey and Canterbury) to accommodate Y.F.C. members for special short courses. The buildings will remain the visible evidence of the regard in which those who made the sacrifice were held, but in the achievements of members who will study there in the years to come will rest the true memorial.

To keep in touch with the college authorities regarding the proposed buildings a national memorial administration committee was set up at the meeting.

Land Settlement

A report was given of the interview between the Minister of Lands, Mr. Corbett, and a deputation from the Dominion Executive Committee concerning the Y.F.C. land settlement scheme. The Minister had indicated his agreement with the principles of the scheme and had stated that he hoped to be able to make some provision within 12 months for the settlement on the land of young farmers who were not ex-servicemen. Mr. Corbett had outlined steps being taken to speed rehabilitation settlement and was firmly of the opinion that the land settlement needs of those who were not ex-servicemen could not be long postponed.

In his report the Dominion president for 1949-50, Mr. E. Rabbidge, stated that on April 30, 1950, there were 332 clubs, an increase of 16 for the year. Twenty-nine new clubs had been formed, but 13 had temporarily ceased operations. There were 37 clubs in post-primary schools throughout the Dominion.

Consideration was given to every important aspect of the federation's work and it was decided to continue all its national activities. These, which included the national debating contest, the national stock-judging contest, the national miniature rifle shooting contest (arranged on a postal basis), were conducted with considerable success in the past year.

◆

CEREALS FOR GREENFEED

By C. P. WHATMAN, Instructor in Agriculture, Department of Agriculture, Timaru.

THE growing of special crops for greenfeed is an important part of the management of many farms in New Zealand. Italian ryegrass is probably the most valuable plant for the purpose, but it suffers from the disadvantage that to be at its best it must be sown on a fallow when the nitrogen status of the soil is good. Cereals are less particular as to the conditions under which they are grown—for instance, they will produce a useful bulk of greenfeed when following a white crop—and they may be produced expressly for greenfeed or grazed before being shut up for seed.

THE area of cereals used for greenfeed in the years 1942-43 to 1946-47 and the acreages of the crops grown in each of the land districts during 1946-47 are shown in the tables below.

The ratio of the different crop acreages varies tremendously from district to district. Auckland and North Auckland areas grow a large proportion of maize and millet, most of the oats are grown in Canterbury, and nearly all the ryecorn in Otago and Southland. Though barley is fairly evenly distributed throughout the land districts, wheat is confined mainly to Canterbury and Otago.

TABLE I—AREA OF CEREALS USED FOR GREENFEED

	1942-43 (acres)	1943-44 (acres)	1944-45 (acres)	1945-46 (acres)	1946-47 (acres)
Wheat	1,995	3,932	3,710	2,417	1,771
Oats	64,639	71,025	51,587	38,660	49,767
Barley	6,008	7,566	5,161	5,458	9,071
Maize	5,153	5,677	6,108	8,087	6,300
Millet	728	873	1,059	762	1,061
Ryecorn	1,864	1,666	1,381	2,179	2,496
Totals	80,387	90,739	69,006	57,563	70,466

TABLE II—AREA OF CEREALS GROWN FOR GREENFEED IN EACH LAND DISTRICT. 1946-47

	Wheat (acres)	Oats (acres)	Barley (acres)	Maize (acres)	Millet (acres)	Ryecorn (acres)	Total	Percentage of New Zealand acreage
N. Auckland	9	1,252	318	1,539	150	—	3,268	4.5
Auckland ..	10	2,135	816	3,034	450	4	6,449	9.0
Gisborne ..	12	189	223	376	16	—	816	1.0
Hawkes Bay	35	2,237	1,659	251	130	—	4,312	6.5
Taranaki ..	5	621	65	239	11	—	941	1.5
Wellington ..	58	2,776	1,151	713	225	3	4,926	7.5
Marlborough	161	2,744	455	25	2	16	3,403	5.0
Nelson ..	3	1,759	72	64	30	2	1,930	3.0
Westland ..	—	146	10	—	—	—	156	0.2
Canterbury ..	983	28,336	1,841	40	—	96	31,296	43.0
Otago ..	472	4,406	1,232	19	—	1,562	7,691	11.0
Southland .	23	3.185	1.229	—	—	813	5.250	8.0

In addition to the areas shown in Table I a large area of the oats and wheat harvested for grain or chaff has provided a certain amount of grazing. The areas used for greenfeed show a considerable decrease on corresponding figures for some years ago, a decrease which can probably be explained by the improved pasture position brought about by the use of better strains of grasses and clovers, which are productive over a greater part of the year. However, very considerable seasonal variations in pasture production still occur and the growing of supplementary greenfeed crops will, by assisting in the feeding of stock in the periods of growth shortages and making possible the carrying of more stock, contribute to the complete utilisation of the pasture growth in flush periods.

Besides the general purpose of assisting in balancing the amount of feed available in different seasons of the year greenfeed has certain special purposes in animal husbandry. It is ideal for flushing ewes before rams are put out and it provides a valuable addition to the winter ration for the ewes. Some green, succulent feed just before and at lambing assists in the prevention of diseases associated with lambing—dopiness (twin lamb disease or ante-partum paralysis) and milk fever. It also stimulates the milk flow of both ewes and cows at the start of their lactation periods.

It is desirable at the beginning of the growing period to keep stock off permanent pasture as far as possible, and if it is necessary to graze the first growth heavily, the flush of feed will

HEADING PHOTOGRAPH: Sheep on greenfeed oats.

be delayed for some weeks, because "leaf makes leaf" and the only way in which pasture plants can grow strongly is by carrying some leaf. Where greenfeed is available in the spring it is possible to carry stock without making heavy inroads into the first of the spring grass growth. Another advantage of the greenfeed paddock is that it can be used in wet periods when the permanent pasture would be damaged by poaching of the paddocks.

The main periods during which cereal greenfeeds are required are in summer, as a supplement to grass growth in dry periods; in autumn, for fattening lambs where rape has failed or where there is insufficient of it, and for flushing ewes; in winter, as a supplement to turnips or when the root crop is unsatisfactory; and in spring, for lambing feed. The types of cereals which can be used cover a fairly wide range, each type having its particular value under certain conditions.

Oats

The figures for 1946-47 show that of the 175,939 acres of oats sown in New Zealand 49,786 acres were used for greenfeed only. Much of the balance would be shut up for a crop only after a certain amount of grazing had been obtained. Of the 49,786 acres grown for greenfeed about 8000 acres were grown in the North Island and about 40,000 acres in the South Island (28,336 acres in Canterbury).

In the South Island the growing of oats for greenfeed is confined mainly to sheep farming areas which have severe winters and dry summers. The time of feeding off and the purpose for which feed is required are the factors which influence time of sowing, cultivation, and the place of greenfeed oats in the crop rotation.

Oats for greenfeed are usually sown after grain crops of wheat or oats, though they are sometimes sown on ground out of lea in an endeavour to eradicate twitch or browntop, when they are regarded mainly as catch crops.

Cultivation

Cultivation is not usually extensive when oats are sown after stubble, though it is certain that considerable benefit would result from a short fallow between deep ploughing and subsequent surface cultivation. Cultivation must, of necessity, be more thorough when oats are sown on ground ploughed out of lea. In deciding what cultivation should be carried out it should be remembered that the main objective is the provision of a firm seed-bed with a fine and moist tilth underneath but having some rough material on the surface. It is usually best to drill the seed, and broadcasting should be done only on occasions of urgency or where drills are not available.

Varieties

The varieties of oats commonly used are Algerian, Duns, and varieties of the Gartons type. Algerian is the most useful for greenfeed, as it is fairly frost resistant, tillers well, stands close and continuous grazing up to the beginning of September, recovers well after grazing, and is the most drought resistant. Algerian is also rust resistant. As germination in the field is likely to be poor if immature seed is sown, it is advisable to use 1-year-old seed.

Duns possesses characteristics similar to Algerian, is more palatable, but is slower growing and does not produce the same bulk of feed. It is popular in districts where the climate is fairly severe, as it is extremely frost resistant. However, because of its very prostrate habit, it suffers from the disadvantage that it becomes very dirty if grazed when the ground is at all wet.

Gartons Abundance and Gartons Onward are more upright growers, with broad, coarse leaves, producing a good bulk of feed, but they will not stand close and continuous grazing and are susceptible to rust. A frost-resistant variety, Black Scotch is often used for high-country sowing.

There are some new oats which have been introduced recently or which are in the process of being tested against established varieties. Among them is Winter Grey, which has rapidly become popular in some districts. It is a semi-erect type—more so than Algerian—with fine leaves.

Sowing

Oats are sown at the rate of 2 to 2½ bushels per acre in autumn or 3 bushels per acre in winter and spring, the seed being either drilled in 7in. rows or broadcast and lightly harrowed in. Broadcasting is common in the North Island.

When oats and grass are sown together the seeding rate of oats is reduced by ½ to 1 bushel per acre. Seeding is increased on heavier types of soil. Algerian and Duns when sown in February-April are ready for grazing 2 to 3 months after sowing and may be grazed up to September, when growth tends to become woody and of low feeding value. In parts of Otago and Southland oats are mainly spring sown and so provide very little grazing.

It is a sound practice to apply 1½cwt. of superphosphate per acre and in many parts of the North Island 2 to 3cwt. per acre is often used. Oats are not likely to benefit from applications of special potash or nitrogenous fertilisers except under special circumstances.

Utilisation

Greenfeed oats are utilised mainly as sheep feed in late autumn, winter, and spring, though cows are also grazed on oats in some of the dairying districts; on the average the carrying capacity from May to September is in the vicinity of 7 sheep per acre. Though frequent attempts are made to milk cows and fatten sheep on greenfeed oats alone, the practice is not recommended nor is it profitable, as the feed is deficient in certain essential minerals necessary for milk and fat-lamb production. When used as a change, or supplemented by a good run-off on grass with roots and good clover hay, greenfeed oats are a valuable feed. It is advisable to feed the crop off in breaks, and it should be noted that once ewes have a run-off on greenfeed they are loath to return to turnips.

[*J. P. Malcolm photo.*

Two varieties of feed barleys, which are all 6-rowed. Cape (left) is commonly grown and Wong (right) is a hybrid which was produced in China. It recovers well after repeated grazing.

Where oats or any similar cereal follows grass, attack by grass-grub may occur and it can prove serious.

Barley

Of the total area of 62,845 acres sown in barley 9071 acres were sown for greenfeed only in 1946-47. It is possible that a small portion of the remaining area was lightly grazed before it was closed up for grain, but the practice is not common, as barley for malting purposes is usually spring sown. Almost 50 per cent. of the barley specifically sown for greenfeed is grown in the sheep farming districts of Hawkes Bay and Wellington, the remaining 50 per cent. being grown principally in Marlborough, Canterbury, Otago, and Southland. Barley is useful for two main purposes: First, for the provision of winter and early-spring feed similar to that supplied by oats; secondly, for the rapid production in dry areas during summer and early autumn of a greenfeed catch crop. Compared with oats barley has the advantage of rapid initial growth and good recovery after grazing, but is a lower yielder, is less frost resistant, and goes off more quickly.

Barley can be used as a catch crop to fill the gap between the harvesting of a cereal crop in the autumn and the preparation of a field for roots or rape, and it is sometimes sown after the failure of rape and grass, or roots, to provide a quick bite of feed.

When barley is sown in March-April for winter and spring feed cultivation is similar to that required for oats which follow stubble or a catch crop of oats used to eradicate twitch. Where barley is required for early-autumn greenfeed, where it is sown after failure of rape or roots, or where it is sown on stubble ground immediately after clearing has been done fields are skim ploughed or disced, cultivated, harrowed, and the seed drilled (or occasionally broadcast).

[J. P. Malcolm photo

Typical growth habit of Wong barley.

Varieties

In contrast to the malting barleys, which have only two rows of grain along the head, feed barleys are all 6-rowed. Generally feed barleys are larger, faster-growing, more bulky plants than the malting varieties and have broader leaves. The two common varieties are Black Skinless and Cape, the latter being more popular. It over-winters successfully in most seasons and is therefore suitable for autumn sowing and periodic grazing until spring. In the young leafy stage plants are semi-erect, with a moderate number of tillers and floppy, broad, comparatively short leaves. In the early stages of growth Black Skinless is similar to Cape except that it is recognised as being somewhat faster growing. In seasonal production and behaviour under grazing Black Skinless is similar to Cape.

A number of overseas varieties has been introduced to try to discover a variety that will recover better after grazing than the present varieties, or one which can be grazed later into the spring. The best of the introductions appears to be Wong, a hybrid barley produced in China and now being grown as a winter barley in the north-east states of the U.S.A. Its early growth is dense and prostrate, with many tillers. The leaves are long, but narrower and lighter in colour than Cape. Wong maintains this dense leafy form throughout the winter and early spring and recovers well after repeated grazing. Yield and recovery trials are still being carried out with it, but present indications are that it will have a place as a supplement to the existing varieties.

Wheat

Of the total of 144,000 acres of wheat grown in 1946-47, 90 per cent. was in the South Island—70 per cent. in the Canterbury district. Of the Dominion acreage 1771 acres or 1.2 per cent. was grown for greenfeed only. Some of the latter acreage may have been sown for a grain crop in the autumn, but because of feed shortage, was grazed to such an extent in winter and early spring that the chances of obtaining a satisfactory grain crop became remote and the crop continued to be treated as greenfeed.

Since the introduction of heading varieties of wheat, which are less liable to lodge, the feeding off of wheat grown for a grain crop has ceased to be standard practice and the procedure is now confined mainly to very heavy land—such as that of the Willowbridge and Coldstream districts, where varieties such as Dreadnought and Hunters are grown—or to occasions when seasonal feed shortages make it necessary to graze the wheat. It is probable that 10 per cent. or less of the wheat crops are intended to supply grazing, but the proportion eventually grazed, because feed is required or exceptionally heavy growth has been made, may be as high as 20 per cent.

Hunters is perhaps the best wheat for feeding off, as it is usually autumn sown and is a strongly rooted, robust plant. Tuscan and Cross 7 are also suitable, but do not appear to stand such heavy grazing as Hunters. No attempt should be made to utilise spring-sown varieties for greenfeed.

The feeding off of wheat is quite a sound practice provided it is done by large mobs of sheep as quickly and as evenly as possible when the soil is in good, dry condition, and provided that grazing is not too severe or continued too late in the spring.

Ryecorn

The use of ryecorn appears to be increasing throughout the areas in which cereals are grown for greenfeed, more especially in the Southland area where, though the latest available figures do not confirm the statement, ryecorn is said to be the most important cereal grown for greenfeed. It is particularly valuable on medium soils of low organic content, where its growth is better than on the richer soils. The reasons for the increasing popularity of this crop are its quick growth, rapid recovery after grazing, ability to give winter grazing if necessary, early-spring growth, and, under Southland conditions, its tremendous spring growth. The early-spring growth is particularly important because where pasture comes away late in spring, ryecorn provides that early green bite necessary for stock and at the same time makes it possible to spell pastures.

Until recently Emerald was the only variety available, but there are now new winter varieties which are vastly superior; they are broader in the leaf, stool out better, stand frost better, give a very much greater bulk of feed, and recover from grazing much more rapidly than Emerald.

The time for sowing ryecorn varies according to the period at which the feed is required, and any period other than late autumn and winter appears to be satisfactory.

The crop may be sown at the rate of 2½ to 3 bushels per acre for greenfeed and grain crop on a fallow, usually after turnips, for use as a cleaning crop; annual weeds are eaten out

[J. P. Malcolm photo.

Plants of Black Skinless, a popular barley for greenfeed.

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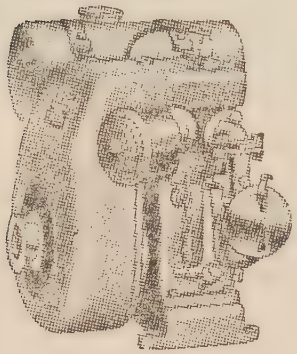

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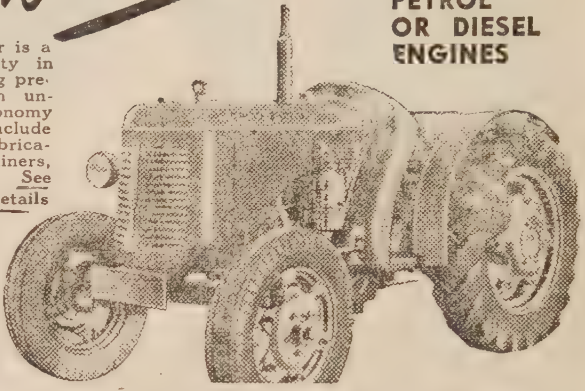

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during the autumn and spring grazing. When a seed crop is to be taken the paddock is shut up at the beginning to the middle of October. As the crop does not shake, direct heading is the usual method of harvesting. The paddock is usually sown to grass immediately after harvest.

Ryecorn may also be sown after a grain crop in March, the seeding rate being the same as that mentioned in the preceding paragraph. A crop sown in March will give less autumn feed, but spring growth is good.

Another practice is to sow ryecorn (at the rate of 1 to 2 bushels per acre) with grass and clover in December-January. A seed crop may be taken after the paddock has been grazed, but it is more frequently grazed right on. Pasture establishment under ryecorn is only successful if the seeding of the ryecorn is reduced to 1 to 2 bushels per acre.

In some districts ryecorn is used as a lamb-fattening feed (one of its attributes is that lambs feeding on it do not scour) when it is sown early in January. After lambs have been fattened the paddock is used for winter and spring grazing.

Grazing Procedure

Ryecorn should be grazed in breaks, because grazing can then be controlled much better. Though growth rate will vary in different districts and from season to season, ryecorn is usually ready for grazing from 4 to 6 weeks after sowing. Grazing must begin early —as soon as the crop has obtained sufficient length—and must be fairly hard.

Maize

Unlike other cereals, maize is grown very little in the South Island, and the most extensive areas are in the warm, frost-free parts of the Auckland and North Auckland Land Districts. Because greenfeed maize does not require as long a growing season free from frosts as maize harvested for grain, maize may be sown for greenfeed in some districts where it would not be possible to harvest a grain crop from it. It is infinitely better to grow maize specially for greenfeed than, as is not infrequently the case when feed becomes short, to make inroads into a maize crop planted for seed.

Cultivation

The ground for a greenfeed maize crop should receive a thorough preparation, beginning early so that the soil can be worked down and mellowed to a fine, firm seed-bed. Except on the lightest soils (the pumiceous soils, for example), where too early cultivation before sowing has been shown to be detrimental to the subsequent crop, cultivation should be started several months before time of sowing. Early ploughing allows winter rains and frost to assist in breaking down the turf and large soil particles.

Sowing

Maize for greenfeed is sown at the rate of 2 bushels per acre and is either drilled in 7in. rows or broadcast and disced in. Best results have been obtained by using a mixture of equal parts by weight of blood and bone and superphosphate or serpentine superphosphate at the rate of 3 to 4cwt. per acre, the heavier application being used on the lighter land and for all second and third crops. Seed can be sown at any time from mid-October to mid-November.

Varieties

All varieties of maize may be sown for greenfeed, but Hickory King has a good reputation and Marigold is also widely used because of its leafiness. Early Butler, a quick-maturing, sturdy plant, should be used where sowing has had to be done later than is desirable. Pfister hybrid No. 360 is not recommended for use as greenfeed, but it can be sown if other varieties are unobtainable.

Utilisation

Greenfeed maize can be carted out or fed off in breaks. It is used irrespective of the stage of growth, though the "glazed-grain stage" is the most economical time to feed it. Maize is not a good fodder for milk production, but it will keep stock in excellent condition so that milk production can be held.

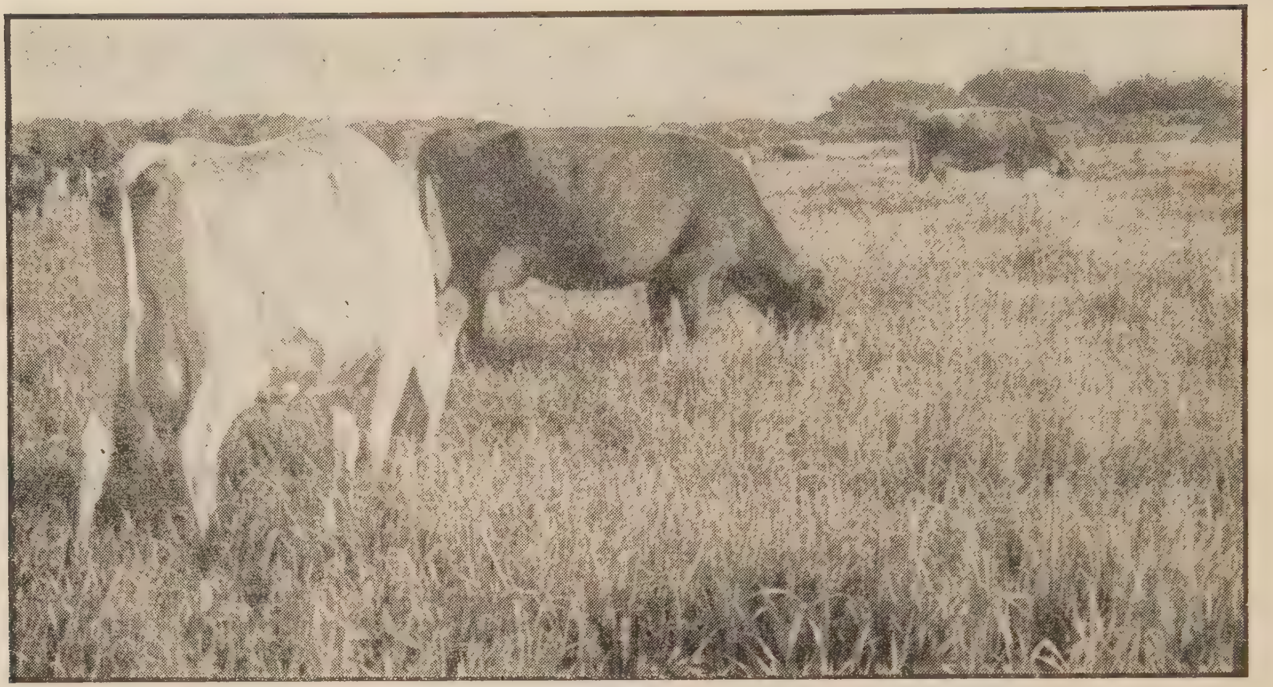
Millet

Broom corn millet (commonly sold for bird seed) is toxic to stock and must not be used for greenfeed.

Japanese millet can be used for grazing in summer and autumn in the same way as greenfeed maize. It may be broadcast or drilled in 7in. rows at the

Dairy cows on a break of greenfeed maize.

USE OF CEREALS FOR GREENFEED



Cows grazing on millet; the feeding value of this crop is highest when it is 6in. to 9in. high.

rate of 15lb. of seed to the acre in November-December when the soil has become really warm. Land for millet should receive a dressing of from 2 to 4cwt. of superphosphate or serpentine superphosphate per acre.

Preparatory cultivation for millet should be the same as for maize unless the millet is to be a catch crop between seasons. In the latter circumstances cultivation should be as thorough as is possible in the limited time available.

Utilisation

The feeding value of millet is highest when the crop is from 6in. to 9in. high and it falls rapidly later. After the first feeding off the field can be shut up for a second grazing, but this is usually light because the plant is running to seed.

Millet is not a high-yielding crop and though it is useful as a catch crop, usually it should not be sown on light land unless this has been well manured, because it demands fairly high fertility and may be inclined to impoverish light soils, making regrassing difficult.

Sorghum

Because of its low production compared with that of greenfeed maize in New Zealand, sorghum is seldom grown. In a hot, arid climate sorghum will outyield maize, but except, perhaps, on some of the sandy coastal country in the Bay of Plenty and North Auckland, New Zealand conditions favour maize greatly.

When sown for greenfeed sorghum should be drilled in 7in. rows or broadcast at the rate of 1 to 2 bushels per acre. Cultivation and manuring should be the same as for greenfeed maize.

Sorghum should be fed off only when it is in full flower. It should not be fed off after it has been frosted, nor should stock be permitted to graze the young second growth from the stubble. This warning is given because there is a danger of poisoning from prussic acid, which develops at certain ill-defined stages of growth. Different writers have stated that the two periods which it is recommended should be avoided are dangerous.

It is safer to cut sorghum and cart it out. If the first cut is made when the crop is 2 to 3ft. high, several cuts may be obtained, but yield and quality will be better where the initial cutting is delayed until the crop has come into head.

Short Fallow

One aspect of greenfeed production which applies to all the crops discussed and which is fundamental to their successful growth is the necessity of providing a short fallow. Where practicable a bare fallow of 6 weeks or so between the initial ploughing and final surface cultivation before sowing is sound practice; seed may strike well where no fallow is allowed, but subsequently crops may turn yellow and growth become unsatisfactory.

Correct Utilisation

Incorrect utilisation of even the highest-yielding greenfeed crop will reduce considerably the value of yield. All that animals require for healthy maintenance or growth is the presence of a certain amount of various substances in the daily ration. Cows or sheep that are in calf or lamb or are milking require an adequate supply of minerals for bone formation in the growing foetus or for the production of milk. Cereal greenfeeds are low in calcium and phosphate and do not supply the full requirements of the essential minerals. The result is that animals either draw on the mineral supply of their own bodies or the minerals must be supplied by other means. Where animals are being grazed on greenfeed it must not be thought that supplements such as chaff, roots, grass, roughage, grass hay, and cereal straws are supplying all the essentials, as these supplements, too, are mineral deficient. Supplements such as good clover hay, lucerne, hay, or good mixed pasture, however, will help to provide the constituents not present in greenfeed and will enhance greatly the value of greenfeed.

Many nutritionists consider that a large number of troubles in pregnant ewes and cows are caused by indiscriminate use of greenfeed or other bulky, mineral-deficient feeds during the pregnancy period, and farming experience bears out this contention.

Where ewes or cows are not confined to greenfeed, but are given suitable supplements and adequate spells on a good mixed sward, the carrying capacity of the farm as a whole is increased and stock losses and lambing troubles are reduced.

Notes on maize, sorghum, and millet by E. R. Marryatt, Fields Instructor, Department of Agriculture, Whakatane, have been incorporated in this article.

A Mechanical Sprayer Operated by One Man

A SIMPLE and very effective mechanical spraying attachment was devised and operated in the 1948-49 season by Mr. A. J. Boyes, a fruit grower of Twyford, Hastings, who had an exceptionally clean crop and was more than satisfied with the operation of the attachment. It can be made and fitted to any crawler or portable outfit which has sufficient pump capacity to enable it to be operated by only one man, the driver. This unusual spraying attachment, which has aroused much interest among local growers and visiting growers from many other districts, is described in this article by R. K. Johnson, Horticultural Inspector, Department of Agriculture, Hastings.

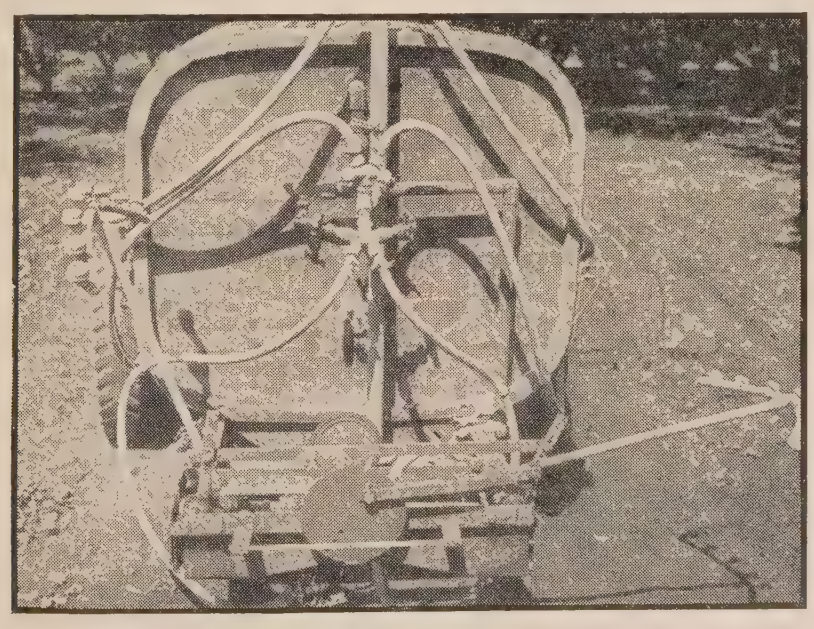
[*R. W. Orr photo.*

The spray attachment and extension boom in operation.

MR. BOYES'S sprayer is a portable, tractor-drawn outfit. Many of similar design and construction are operated in orchards today. A strong, 2-wheeled chassis has mounted on it a 35-gallon-per-minute pump, driven by a 6-cylinder engine, complete with clutch and gearbox. The pump is directly coupled to the gearbox shaft, the gearbox being in second gear to drive the pump at the correct number of revolutions.

The engine radiator has been eliminated, the engine being water cooled by a small marine gear pump, which forces the water through a system of pipes running through the spray vat, which, when filled with spray, cools the water being circulated through the pipes. A water supply tank has been mounted above the engine, the water being fed into the top of the engine in the normal way. The marine pump is fitted to the side of the engine and is driven by a V belt from the pulley which normally drove the fan. The fan pulley has an extra pulley fitted to it, a V belt from this driving a shaft which operates the engine governor and the agitators inside the vat, enabling them to be operated independently of the pump.

The outfit is controlled by a ratchet brake lever mounted within easy reach of the tractor driver. This lever controls both the engine clutch, which puts the pump in and out of operation, and the accelerator of the spray engine. A rod from the lower end of the lever operates the clutch and the accelerator rod is fitted near the top of the lever. When the lever is pushed back it engages the clutch and the spray engine is accelerated to the required speed.



[*R. W. Orr photo.*

The construction of the spraying attachment and the curved broom heads.

The Spraying Attachment

The mechanical spraying attachment is a simple unit mounted on the chassis at the rear of a 400-gallon vat and consists of two 8-nozzle spray brooms clamped in movable brackets, one on each side of the chassis. These movable brackets are bolted together as a unit by an adjustable iron bar, one clamp being bolted to a bar fitted off centre to a central, circular iron plate. This eccentric iron plate is chain driven off a shaft taken from the rear end of the pump. The eccentric drive to the brackets causes the spray brooms to be raised and lowered, giving a sweeping up and down action to the brooms rather similar to the normal hand-operated motion.

The spray brooms are set at opposite angles. When the left-hand broom is at the top of its sweep the right-hand is practically at the bottom. These brooms are ordinary hand spray brooms, having curved heads fitted to them. The curved heads have been designed to throw a wide wall of spray, practically a semi-circle, so that spray is thrown forward to the tree being approached and back to the tree just passed, ensuring a complete coverage. This spraying attachment is a very compact unit, having few movable parts to give trouble, and is mounted on the space normally required for the platform for the operators to stand on.

For the spraying of tall and spreading trees an adjustable boom is mounted up the centre and at the rear of the vat. This extension boom consists of

A MECHANICALLY OPERATED SPRAYER . . .

an 8ft. length of 1½in. piping with a reducing clamp fitted to the top, through which is inserted a 10ft. length of inch piping. A sliding collar with a locking bolt is fitted to the inner piping, allowing it to be extended or lowered and held to the required height. The inner piping has a 6in. crosspiece fixed to the top, to which are fitted two 2½ft. lengths of piping with 7-nozzle broom heads mounted to the ends. These broom heads are also curved and can be set at any angle to throw a good covering spray on to the tops of the trees. Lengths of spray hose carry the spray to the crosspieces with the brooms fitted to them. Each spray broom can be shut off independently, so that any side or extension broom can be used if desired.

Many Advantages

This type of sprayer has many advantages over the previous method of spraying. The greatest is that this outfit is operated entirely by one man, the tractor driver, instead of three men as required before. Thus there is a big saving of labour and time, which is especially valuable when labour is scarce.

The operator is well clear of any spray, so there is not the necessity to be so well protected as when operating the brooms by hand. The spraying work generally is also a very much more pleasant operation than formerly.

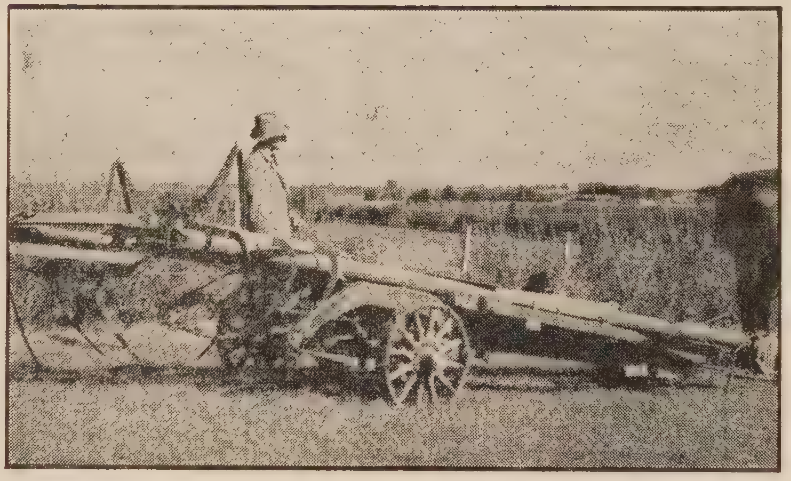
An excellent tree coverage has been obtained, even when tall and spreading trees are sprayed. Mr. Boyes's exceptionally clean crop of fruit testifies to this good spraying cover.

Spraying time has been cut down to a minimum, the 400-gallon vat now taking about 20 minutes to put out, whereas before it took from 30 to 35 minutes.

There is a saving of spray; even with all brooms operating 500 trees can be sprayed, with a saving of 36 gallons of spray compared with the previous method.

The attachment is very adaptable and can be quickly and easily adjusted to suit the height of any trees to be sprayed.

CARRIER FOR HAY STACKER



[*Neuline Film Studios Ltd. photo.*

ALL types of farm equipment are very expensive and care of implements is most important. Annoying breakages or losses sometimes occur in moving equipment from one paddock to another or from one job to another; anything which makes it easier to keep equipment together—thus cutting down losses of odd parts—which facilitates the moving of machinery, or which keeps equipment away from the ground in the off season (where proper cover in an implement shed is not available) is a valuable asset.

The accompanying illustration shows a simple and effective way of shifting a stacker (a very awkward load for anything but a fairly big lorry) from paddock to paddock, and of keeping the gear together and clear of the ground in the off season. The carrier, which is used by Mr. M. N. Trotter, of Karaka, has been made from an old motor chassis, with rear wheels only attached. The front of the chassis, from which the axle and wheels were removed, is carried on a skid. This provides a brake and makes steering easier. When the stacking equipment is not in use the carrier is drawn under trees in the yard and is ready for use again the following season.

Any farmer should be able to obtain equipment such as that used by Mr. Trotter from a motor wrecking firm or, perhaps, from a local garage.

—A. J. KERSE, Fields Instructor, Department of Agriculture, Auckland.

Radio Broadcasts

THE following radio talks will be given to farmers from Station 1YA Auckland at 7.15 p.m.:—

August 2—"Buttercup Control," by G. L. Banfield, Instructor in Agriculture, Department of Agriculture, Thames.

August 9—"Problems of Hill-country Farmers," by A. J. Price, Fields Instructor, Department of Agriculture, Te Awamutu, and K. Montgomery, Fields Instructor, Department of Agriculture, Taumarunui.

August 16—"Unusual Tropical Fruits for Warm Situations," by P. Everett, Orchard Instructor, Department of Agriculture, Auckland.

August 23—"Can the Dairy Farmer Beat the Season?", by J. C. Gerring, Extension Officer, Department of Agriculture, Hamilton.

August 30—"Young Farmers' Clubs," talk arranged by Warkworth District Committee, New Zealand Federation of Young Farmers' Clubs.

The following talk will be given from Station 1YZ Rotorua at 7.15 p.m.:—

Current farming problems talk, "Spring Topdressing and Pasture Management in the Spring," by G. A. Blake, Instructor in Agriculture, Department of Agriculture, Matamata.

Radio talks will be given to farmers from Station 4YA Dunedin at 7.30 p.m. as follows:—

August 8—"Essential Requirements in Town Milk Production," by D. Rose, Senior Dairy Inspector, Department of Agriculture, Dunedin.

August 23—"Fertiliser Practices," by A. G. Elliott, Fields Superintendent, Department of Agriculture, Dunedin.

The following talks will be given from Station 1XH Hamilton:—

August 3—"Stock Troubles," answers to queries, by P. J. McCann, Veterinarian, Department of Agriculture, Hamilton.

August 10—"The Newer Weedkillers," by R. K. Ward, Research Officer, Department of Agriculture, Hamilton.

August 17—"Good Seeds," by A. J. Price, Fields Instructor, Department of Agriculture, Te Awamutu.

August 24—"Prevention of Losses of Cattle in Spring," by D. W. Caldwell, Veterinarian, Department of Agriculture, Hamilton.

August 31—"Spraying Fruit Trees and Vegetables," by I. L. Brown, Orchard Instructor, Department of Agriculture, Hamilton.

Other talks are given from 1YA Auckland on Tuesdays at 12.35 p.m., 2YZ Napier on Tuesdays at 7.10 p.m., 2YA Wellington on Thursdays at 12.35 p.m., and 3YA Christchurch on Mondays at 12.20 p.m.

Pig Broadcasts

Under the auspices of District Pig Councils broadcasts will be delivered in June as follows:—

Auckland—1YA, on August 15, at 7.30 p.m., Open Forum, conducted by H. E. Clark, Supervisor, Auckland District Pig Council.

Hamilton—1XH, on August 1, at 7.30 p.m., "The Carcass Quality Scheme and how it Works," by S. A. Morgan, Supervisor, Waikato District Pig Council.

Napier—2YZ, on August 16, at 7 p.m., "Care of Pigs from Weaning to 4 Months Old," by H. T. Donaldson, Supervisor, Tairawhiti District Pig Council.

Palmerston North—2ZA, on August 18, at 7 p.m., "Pigkeeping in the Manawatu District," by L. L. Marsdon, Supervisor, Wellington District Pig Council.

Christchurch—3YA, on August 24, at 7.15 p.m., discussion on work of District Pig Council Supervisors, by H. W. McIntosh, Supervisor, Canterbury District Pig Council.

Dunedin and Invercargill—4YA and 4YZ, on August 9, at 7.10 p.m., "The Carcass Quality Scheme," by N. MacDonald, Supervisor, Otago and Southland District Pig Council.

History of New Zealand Milking Shorthorns

THE success achieved by the Milking Shorthorn herds at the Dilworth School of Agriculture, Auckland, and at the Ruakura Farm of Instruction (now the Ruakura Animal Research Station) is one of the topics dealt with in this article by J. M. Ranstead, of Matangi, which concludes a series on the history of the New Zealand Milking Shorthorns. The first and second parts of this history appeared in the May and June issues of the "Journal," respectively.

THE last of the early importations of Australian Illawarra Shorthorns was made late in 1915 by the Dilworth Trust Board. The Dilworth School of Agriculture, Otahuhu, Auckland, had just been established under the direction of Mr. Primrose McConnell, late manager of the Ruakura Farm of Instruction, and Mr. McConnell had set out to build up an outstanding dairy herd. After buying a number of the best non-pedigree Milking Shorthorns that could be obtained locally and at Mr. Gordon Salway's sale, where he also bought the imported Darbalara cow Dainty 7th and her heifer calf Lady Mary, Mr. McConnell imported 2 bulls and 7 cows from Australia. The publicity that had been given to the show and production records of the Darbalara cattle and the reputation that Mr. McConnell had made, through his numerous articles in the New Zealand agricultural journals and farming papers, created a wonderful demand for the young bulls bred at Dilworth. Bull calves by Marlborough of Darbalara (imp.) out of non-pedigree cows without official records of production sold readily by private sale for prices up to 100 guineas.

Record Prices at Dispersal

Though the herd proved such a success, the School of Agriculture did not prosper, and in 1919 the Trust Board decided to disperse the herd. At the sale, held on December 1, 1919, breeders from all over New Zealand attended and record prices were realised.

> **Such high prices had never been heard of for Milking Shorthorns in New Zealand and a sensation was created when Mr. James Parkinson, of Opotiki, paid 650 guineas for the imported bull Marlborough of Darbalara.**

Mr. Parkinson also paid 350 guineas for the beautiful imported cow Posey 3rd of Coleville.

Mr. McConnell's purchases at the Salway sale proved a good investment, as the imported cow Dainty 7th of Darbalara brought the highest price for a female at the Dilworth sale, being purchased by Mr. P. J. McLeod, of Helensville, for 365 guineas. The imported Lady Mary, also bought from Mr. Salway, went to Mr. J. Law, Waikato, for 100 guineas and her daughter Dilworth Lily, by Mr. Salway's imported bull Rose Prince, went to Mr. G. Chamberlain, Ponui Island, Auckland, for 140 guineas. Dilworth Chic, Dainty 7th's daughter by Marlborough, went to Mr. McLeod for 100 guineas. Mr. Salway's non-pedigree cow Bell Block Nancy, which had given the highest yield in the Dilworth herd, died before the sale, but she had paid her way, for her bull calf by Marlborough had been sold privately for 100 guineas. Her daughter Dilworth Nancy 2nd, by Marlborough, sold at the sale for 80 guineas to Mr. Hann, of Stratford.

The other imported stock sold well: Rose 4th of Darbalara was bought by Mr. J. L. Turnbull, Christchurch, for 150 guineas. She was a beautiful cow and the following year won the championship at the Christchurch show. She was considered a model of Shorthorn dairy type and is the cow depicted in the standard of excellence published in the New Zealand Milking Shorthorn Association's herd books. Vera 2nd of Coleville was purchased by Mr. B. H. Slack, Otaki, for 105 guineas and Caroline 3rd of Darbalara by Mr. J. McGovern, Waikato, for 91 guineas. Dilworth Beauty, out of Caroline 3rd by Lily's Cupid of Darbalara, was bought by Mr. J. Glasgow, Waikato, for 168 guineas and her twin 11-months-old daughters by Marlborough were bought by Mr. McGovern for 78 guineas apiece. Dilworth Constance, out of Connie 4th of Darbalara by Emblem of Darbalara, was bought by Mr. Law for 81 guineas.

Some of the non-pedigree cattle that Mr. McConnell had purchased locally sold for high prices. Dilworth Belle was sold for 320 guineas to Mr. Turnbull, and Mr. J. Irwin, Auckland, paid 180 guineas for her daughter by Marlborough.

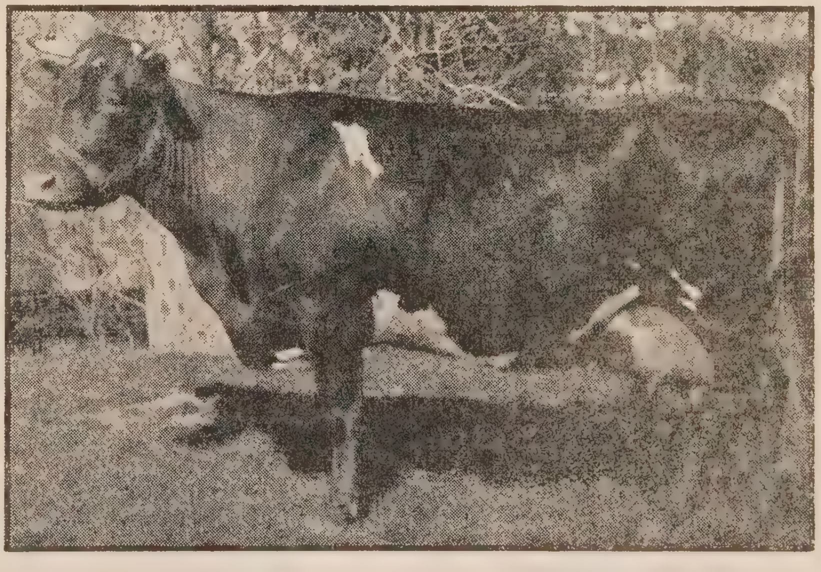
The success of the Dilworth sale stimulated interest in the Milking Shorthorns and created a great demand for bulls. Until that time young bulls had been sold privately at the Ruakura Farm of Instruction, but in April, 1920, an auction sale was held which proved so successful that the sale became an annual event.

Ruakura Herd

When Mr. McConnell went to Ruakura as manager he was a keen admirer of Milking Shorthorn cattle, having had considerable experience of this breed while dairying in Britain. In 1913, while at Ruakura, he had reported:—

> Numerous enquiries are to hand for Shorthorn bulls of the milking strain, and, as showing the confidence that is now being placed in this breed, I may mention that a newly dropped calf from one of our best cows was sold for £35. It is hoped that our small herd of non-pedigree Shorthorns will be improved by the importation of a few of the best that can be imported (14).

The small herd of non-pedigree Shorthorns referred to had been purchased by Mr. McConnell at various dispersal sales of dairy herds in the Waikato. The herd was headed by the Australian Illawarra Shorthorn bulls Melba's Prince of Darbalara (imp.) and Dominion Abram 2nd of Ruakura (imp.), but it was not till after Mr. McConnell left Ruakura that more Illawarras were added to the herd. When Mr. McConnell arrived at Ruakura he found a large herd of almost purebred Coates' Herd Book Shorthorns, headed by English bulls that had been imported for the special purpose of being made "available to dairy farmers for service to approved



Mr. R. V. Brown's Waimea Domingo, G.H.T. 602lb. fat, winner of 63 championships, including three Royal Show championships, and three times champion over all breeds; a most successful blending of Coates' Herd Book and Australian Illawarra Shorthorns.

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14. McConnell, Primrose (1913): "The New Zealand Journal of Agriculture," volume 6, page 32.

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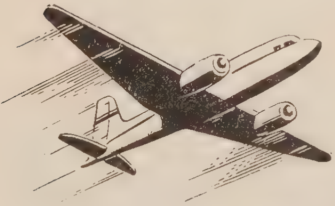

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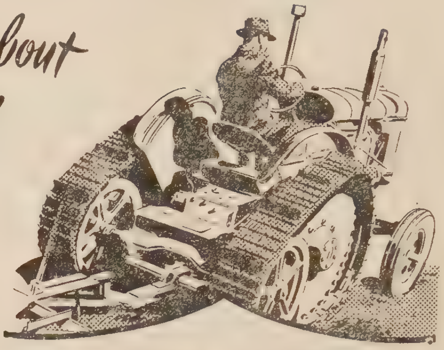

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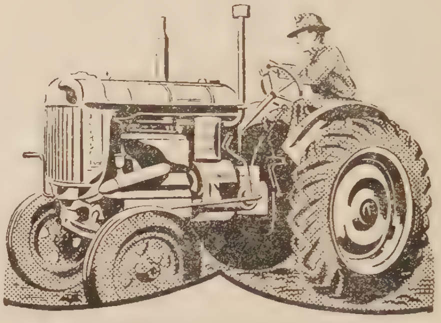

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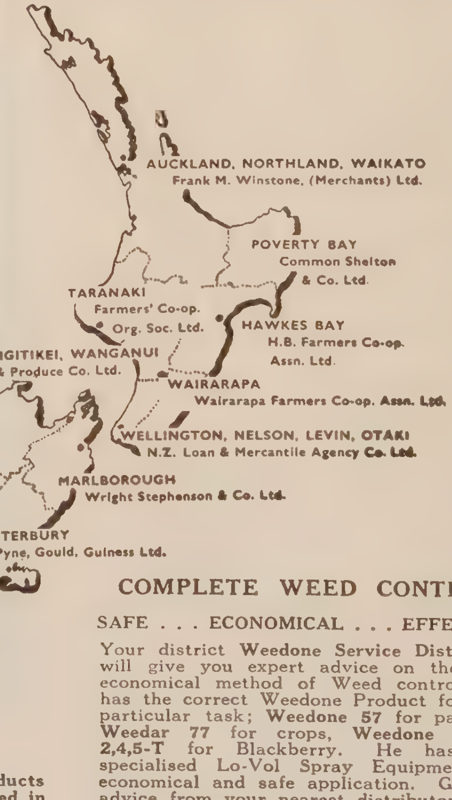
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cows at a reasonable fee" (15). These cattle were quickly got rid of, 60 heifers grazing at Waerenga were sent to the Rangiriri sale and sold as grades, and the rest of the herd were fattened and sold as beef.

Although the Ruakura Coates' Herd Book herd was dispersed, it had left its mark on the dairy herds of the Waikato. Many farmers had sent some of their best cows to Ruakura for service and their bull calves had gone into general circulation as dairy bulls. Mr. A. W. Green, who followed Mr. McConnell as manager, made it his business to buy back some of the best of the females left in farmers' herds by the Ruakura bulls. Ten cows and 10 heifers were bought back from Mr. T. C. Blackett, Te Kowhai, and several from Mr. J. McConaughey, Otahuhu, and Mr. M. Mulcahey, Eureka. These were registered as foundation cows in the newly formed New Zealand Milking Shorthorn Association's Herd Book. Through the years some of the imported bulls had been sold cheaply, when they became old and sluggish, to local farmers and had left many good daughters. One of these, entered as a foundation cow in the new herd book as Maniaroa Princess and tested under C.O.R. by Ranstead Brothers, Matangi, gave 15,950lb. of milk, 700lb. fat, and for some years held the New Zealand mature-cow record.

First Annual Sale

In April, 1919, the whole of the pedigree Darbalara Milking Shorthorn herd at the Weraroa Experimental Farm was transferred to Ruakura; many of these cattle were imported and made a valuable addition to the Ruakura herd. By 1920, when the first Ruakura annual sale was held, Mr. Green had become president of the New Zealand Milking Shorthorn Association and the Ruakura herd of Milking Shorthorns was the most important in New Zealand. In 1925, in the introduction to the catalogue of the sixth annual sale, it was stated that:—

> It is worthy of note that six out of seven class-leaders for Milking Shorthorns under Semi-Official test in the Dominion are by Ruakura bred bulls.

These record breakers were bred by Ranstead Brothers, Matangi, and were by two bulls bred at Ruakura by Darbalara sires out of locally bred non-pedigree dams. The first of these, Dominion Esau of Ruakura, was then the leading C.O.R. bull of the breed, for besides Matangi Quality 4th's wonderful yield as a 4-year-old of 22,010lb. milk, 978lb. fat, his daughters in the Matangi herd had won 14 1st class certificates of record, averaging 533lb. fat. They had competed in 5 classes out of 7 under C.O.R. and had won 5 class leaderships. The best six records of Esau's daughters in the Matangi herd averaged 712lb. fat. The second bull was Dominion Glaxo of Ruakura, whose daughters had won 7 1st class certificates of record, the 4 best averaging equal to 662lb. fat at maturity. Two of these daughters had won class leaderships, one in Ranstead Brothers' herd and one in the herd of the Hon. Mrs. Blythe, Auckland.

NEW ZEALAND MILKING SHORTHORNS

Mr. R. Peach's Duchess of Clydesdale 2nd, champion at the Royal Show, Christchurch, 1927, C.O.R. 10,605lb. milk, 426lb. fat.

Mr. Green left the Ruakura Farm after the sixth sale and became the organising secretary of the New Zealand Milking Shorthorn Association, a position that he held with great success for 20 years. After he left Ruakura competition from other breeders became stronger and it became evident that Ruakura would have to do more testing to maintain the position previously held in the breed. In a later sale catalogue it was stated that:—

> For some years previous to 1926-27 the only records kept of cows at Ruakura were farm records. These were made under disadvantageous conditions, in that the whole herd was used for instructional purposes and the milkers were changed weekly. In order that the cows might have a chance to show their capabilities at the bucket it was decided to put a number each year under C.O.R. test, with the object of having ultimately C.O.R. records for all females in the herd. These cows are milked by one man and are kept in a herd by themselves, but are still milked twice daily by machine and this fact should not be lost sight of when perusing the records below. During the five seasons in which cows have been tested the following records have been established:—

	lb. milk	lb. fat	No. of days	Age
Dominion Conceit ..	16,255	727	365	8 yrs. 336 days
Dominion Alsation	11,894	534	343	5 yrs. 336 days
Dominion Prunus ..	13,280	533	365	3 yrs. 364 days
Dominion Etta ..	13,766	526	365	3 yrs. 345 days
Dominion Althea ..	11,674	537	349	2 yrs. 360 days
Dominion Demure ..	10,401	430	365	1 yr. 200 days

> In all, under C.O.R. test, twice-a-day machine milked, average age 4 years, the average yield of 33 cows was 434lb. fat in 342 days.

During the depression the demand for pedigree stock fell off, and the fourteenth and last Ruakura sale was held in 1933. The herd was carried on for some years on a reduced scale, gradually diminishing, until when Ruakura changed over from a farm of instruction to an animal research station the Shorthorn herd was dropped altogether.

Twenty-year Break

Owing to the New Zealand Government's embargo there were no further importations of Illawarra cattle for more than 20 years, until in 1937 Messrs. G. D. Hall and Son, Kio Kio, imported a bull, Martha Vale Cloister, and later a second bull, Martha Vale Ajax, together with 4 in-calf heifers. These were bred by Messrs. J. W. Treloggan and Sons, Martha Vale, St. Helens, Tasmania, who were the leading Illawarra breeders in Tasmania. Their team of 7 cows entered for the 1937-38 Lactation Herd Test Competition of the Australian Illawarra Shorthorn Society won the Tasmanian branch's prize offered to members securing the highest yield of butterfat in 273 days during the period of the competition. The average for the 7 cows, which put up their records off natural pastures only, was 453lb. fat.

Influence of Illawarras

The early importations of Australian Illawarra Shorthorns may be summarised as follows:—

	Bulls	Cows
New Zealand Government ..	6	10
Fisher	1	4
Wright	2	2
Salway	1	3
Dilworth Trust	2	7
	12	26

These relatively small numbers of imported Illawarras had a most important bearing on the development of the New Zealand Milking Shorthorn breed. The dispersal sales of Wright and the Dilworth School and the bulls bred and sold by the State farms and Fisher spread the blood all over New Zealand. Most of the breeders, in the North Island especially, thus cut themselves off from the Coates' Herd Book.

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15. New Zealand Department of Agriculture (1901): Ninth Annual Report.

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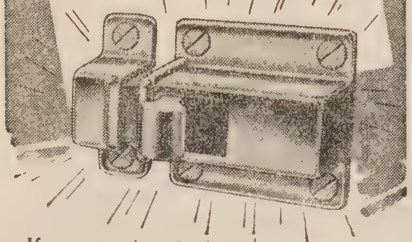

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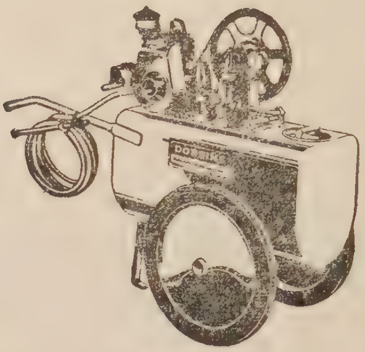

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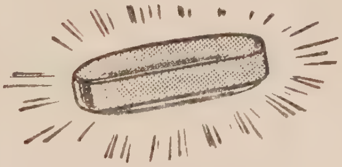

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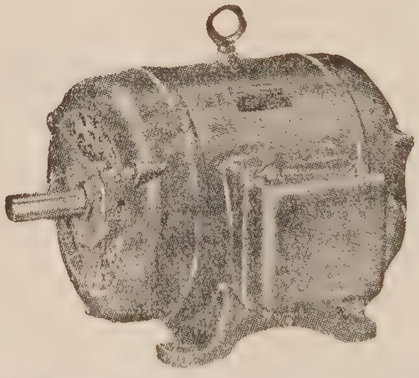

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Some, indeed, had done so previously by using Lincolnshire Red Shorthorns, the following importations of which had taken place in 1911:—

	Bulls	In-calf heifers
Taylor	1	8
Buick	2	1
	3	9

But the Lincolnshire Reds were not popular. At Mr. Buick's sale in 1918 Coates' Herd Book females brought the highest prices. Mr. J. Parkinson, Opotiki, paid 193 guineas for Cloverlea Fancy A2, and Mr. J. Witham, Waiuku, bought Cloverlea Fancy A for 70 guineas. Mr. Parkinson also paid the top price for the Lincolnshire Reds, 87 guineas for Cloverlea Stylish F1, the next highest in price being purchased by Mr. W. Gadsby, Waikato, for 41 guineas. Mr. William Taylor, Waikato, bought the imported Lincolnshire Red bull Cloverlea Gunner for 46 guineas, but there was little or no demand for the other bulls offered. Mr. Taylor was the largest breeder and exhibitor of Coates' Herd Book Shorthorns in the Auckland Province. He was a beef breeder and the Lincolnshire Reds were only a sideline. About 1920, however, he entered the show ring with Lincoln Butterfat, a beautiful Lincolnshire Red yearling bull which proved unbeatable in the Milking Shorthorn classes. Mr. E. A. Washer, Okaiawa, purchased him privately for 100 guineas after awarding him first prize in his class at the Cambridge show. This was about the last publicity that the Lincolnshire Reds received.

From the early 1870's, when Mr. Bluett took over the publication of the New Zealand Shorthorn Herd Book from Sir George Whitmore, Canterbury had been the headquarters of the breed, as when Mr. Bluett gave up the work the Canterbury Agricultural and Pastoral Association carried it on. It is little wonder, then, that the Canterbury breeders gave no support to the New Zealand Milking Shorthorn Association, newly formed in Palmerston North, but in 1914 started their own New Zealand Shorthorn Cattle Breeders' Association. They took over the herd book from the Canterbury A. and P. Association and catered for the dairy section by making provision for the publication of records of production and publicising the existing Coates' Herd Book grading-up scheme. During the next few years very little use was made of these facilities by the dairying section of the breeders and a few drifted away to the New Zealand Milking Shorthorn Association.

In 1913 the Waikato Dairy Shorthorn Association had been formed, but by 1917 it was absorbed by and became a branch of the New Zealand Milking Shorthorn Association. This precedent having been made, some time later it was considered that the formation of a local branch at Christchurch would stimulate interest and steps were taken to do this. In April, 1919, Mr. J. Hodges, president, and Mr. T. H. Windley, a member of the council of the New Zealand Milking Shorthorn Association, while on a tour of inspection in the South Island met a gathering of members of the New Zealand Milking Shorthorn Association in the office of Mr. J. L. Turnbull, Christchurch. Mr. Hodges addressed the meeting and after some discussion the following motion was carried unanimously:—

> That those present, being Canterbury members of the New Zealand Milking Shorthorn Association, form themselves into a committee with power to add to their number, to approach the council of the association with a view to forming a branch of the association in Canterbury.

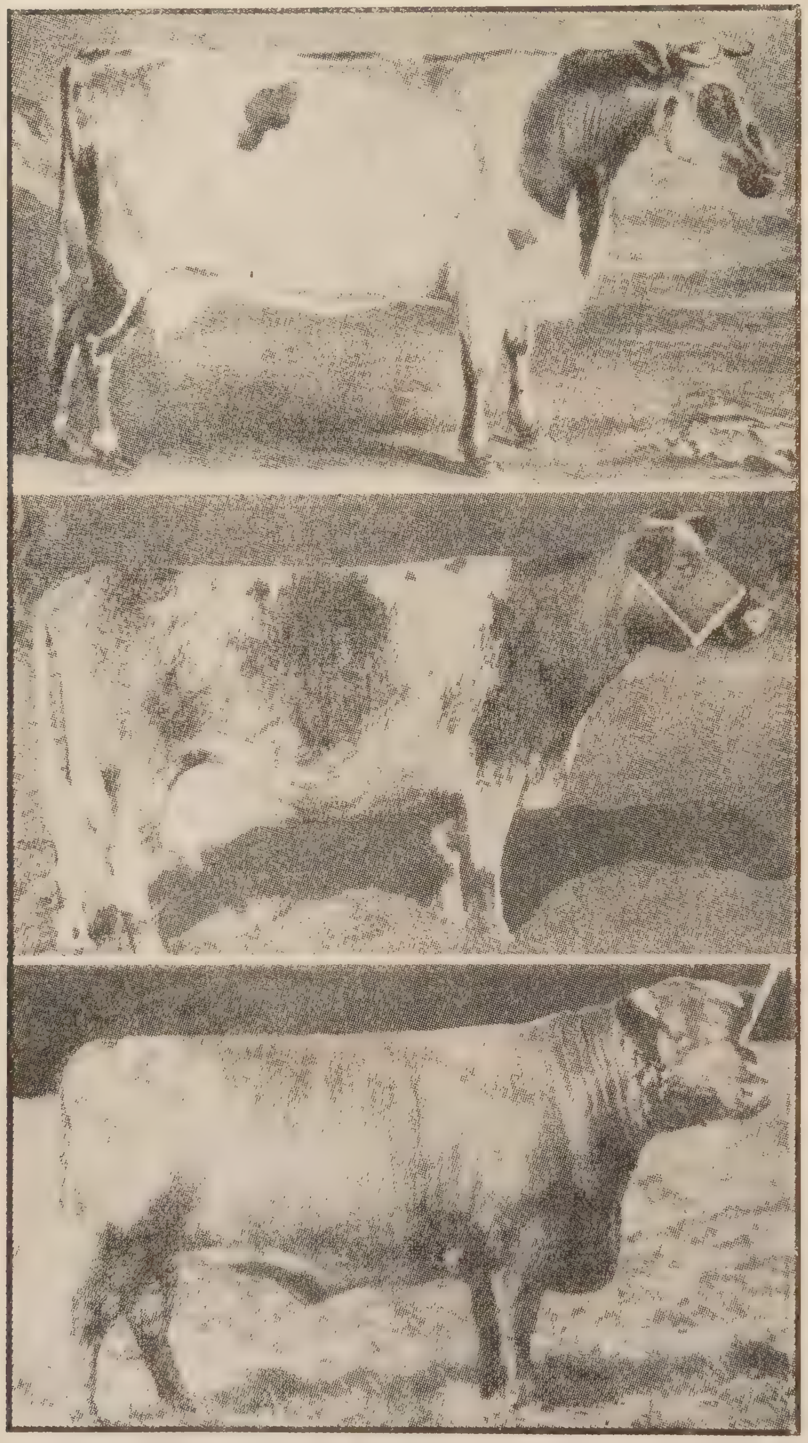
The approach was made, permission was granted, and on June 7, 1919, the first meeting of the Canterbury branch was held. Mr. Turnbull was elected president and Mr. R. Peach representative on the central council.

Vale Royal Herd

Mr. Turnbull had just founded his Vale Royal herd at great expense, purchasing some of the most expensive cattle at the Cornwall Park and Dilworth sales and many others privately at extremely high prices. Very shortly afterward, for private reasons, Mr. Turnbull was forced to disperse his herd. Held at very short notice and poorly advertised, the sale attracted only local buyers, who obtained these carefully selected animals at a fraction of their original cost. Though the sale was unsatisfactory for Mr. Turnbull, it gave the new breed a boost locally. Many of the members of the new branch exhibited their cattle in the classes which were now provided for Milking Shorthorns. This led to a certain amount of confusion, as at the Christchurch show the rival Shorthorn society also had classes allotted to it for dairy as well as beef cattle. Typical Coates' Herd Book cows from the dairy herds of Canterbury Agricultural College, the Sunnyside Mental Hospital, and other well-known breeders were compared with the New Zealand Milking Shorthorn cows by the general public, and the following extract from the Christchurch "Sun," November 26, 1921, reflected the popular opinion:—

> At the recent Metropolitan Show one could not but marvel at the diversity of the type exhibited in the Milking Shorthorn classes. There were Shorthorns of good milking character, animals which showed characters distinctly Ayrshire, and yet others that would not have disgraced a Jersey ancestry. Why should there be this diversity of type? The cause is not far to seek. In or about the year 1913, a Milking Shorthorn Association was formed, and this organisation published a Milking Shorthorn Herd-book. Included in this herd-book were non-purebred cows showing or having the appearance of Shorthorns. Bulls were also registered. The mating of such animals could have only one result, namely, disaster. . . . The majority of the foundation dams and sires originally entered in the Milking Shorthorn Herd-book had no purity of origin; they were simply taken on their appearance. The result of these matings is evident in the Milking Shorthorn classes at the various shows. . . . How could the Milking Shorthorn Association have avoided this state of affairs? The answer is by a good sound foundation stock of Shorthorns, and by the term Shorthorns cattle registered in a standard herd-book are meant. The formation of the Milking Shorthorn Association was a step in the right direction, and the body is to be congratulated on the endeavour to reclaim the milking qualities of the breed existent in bygone days. . . . In any necessary reform the first step is for the Milking Shorthorn Association to combine with the Shorthorn Society of New Zealand. The Shorthorn Society of New Zealand being the older institution, [?] and also being the publisher of the original New Zealand Shorthorn Herd-book, [?] should be approached by the Milking Shorthorn Association, and an endeavour made to reach an amicable working agreement and obviate the publishing of two herd-books one antagonistic to the other. The younger organisation should not expect the Shorthorn Society to register all the cattle which are registered in the Milking Shorthorn Herd-book, but the Shorthorn Society would register all animals showing the requisite number of top-crosses of registered Shorthorn blood. The amalgamation of the two herd-books would be the only difficulty. Some breeders who have cattle entered in the Milking Shorthorn Herd-book would be indignant that their cattle were not eligible for the New Zealand Shorthorn Herd-book, but surely the Shorthorn Society would meet these breeders until the requisite number of registered Shorthorn crosses came in the pedigrees of the progeny. Then the progeny would be numbered and entered in the New Zealand Shorthorn Herd-book. No breeder could expect bulls, the progeny of these cows, to be entered until the required number of registered Shorthorn crosses appeared in the bulls' pedigrees. . . . Surely what has been done in the British Isles can

Mr. D. Buick's Studleigh Nancy Lee, twice champion at the Manawatu show; C.O.R. 17,177lb. milk, 623lb. fat.



[From "The Science of Animal Breeding in Britain," by F. H. A. Marshall and John Hammond.

Types of the Shorthorn breed. Upper—Type of the original importations to New Zealand, which ceased in 1882. Middle—As developed by the British Dairy Shorthorn Association after 1905. Lower—As imported to New Zealand for leading studs when importation was resumed from 1899 onward.

be done in New Zealand. In a dairying country such as this, registered dairy Shorthorns can be bred provided the foundation is well and truly laid.

About the same time, in a report on the exhibits at the Waikato show, a scathing criticism of one of the Government's imported Darbalara bulls appeared in a local paper. This bull was referred to as resembling "a cross between a working bullock and an Indian buffalo."

Grading Up of Stock

What the writers quoted were suggesting was a grading up of the Milking Shorthorns with Coates' Herd Book bulls. This would have been a lengthy process and out of the question for those who had crossed with the Illawarra breed. But some of the breeders still had Coates' Herd Book cows and many had cows with one or more top crosses from which cattle eligible for the Coates' Herd Book could have been bred up. There is no doubt that there were some very good dairy cows among them. For instance, in the Waikato, Maniaroa Princess, by the Ruakura-bred Coates' Herd Book bull Red Light, had a C.O.R. of 15,950lb. milk, 700lb. fat. In the Manawatu Mr. D. Buick Jun.'s Coates' Herd Book cow Studleigh Nancy Lee, twice champion at the Palmerston North show, had a C.O.R. of 17,177lb. milk, 623lb. fat; and Mr. G. N. Bell's non-pedigree Shorthorn Dairymaid, also twice champion at the Palmerston North show, had just broken Maniaroa Princess's record with a yield of 15,350lb. milk, 723lb. fat. Unfortunately, owing to calving late on completion of her lactation, she failed to qualify and was awarded only a second-class certificate. Also in the Manawatu Mr. Edward Law's Maisie, C.O.R. 10,021lb. milk, 431lb. fat, one of the first Shorthorns to qualify under Semi-Official Test in New Zealand, was a non-pedigree Coates' Herd Book cow, bred by Mr. G. N. Wood, Otauru, and traced back to the original cattle of Archdeacon Hadfield, of Otaki. She was purchased from Mr. P. Hemingsen, an employee of Mr. Wood's who had bought her for a house cow. In Canterbury Mr. Robert Peach's Coates' Herd Book cow Duchess of Clydesdale 2nd had an unbroken record in the show ring and was champion at the Royal Show, Christchurch, in 1927. She had a C.O.R. of 10,605lb. milk, 426lb. fat. Two of her Coates' Herd Book granddaughters, tested later by Mr. J. Peach, put up the following records: Ashley Bank Winsome, senior 4-year-old class leader, C.O.R. 17,687lb. milk, 731lb. fat; Ashley Bank Sea Spray, C.O.R. 16,280lb. milk, 710lb. fat.

A grading-up scheme might have been brought into effect a few years later when the New Zealand Milking Shorthorn Association decided to import a shipment of Dairy Shorthorn bulls from England. After all arrangements had been made, however, an outbreak of foot-and-mouth disease in England prevented the importation.

British Dairy Shorthorn Association

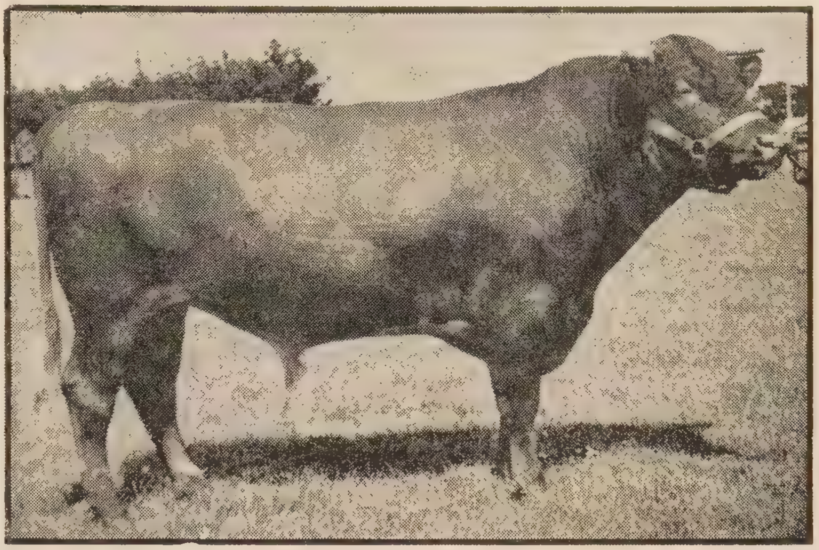
Since Mr. Gilruth had selected Shorthorns for the New Zealand Government in 1901 the British Dairy Shorthorn Association had been formed. The chief work of this association lay in milk recording and it may be said that it was among the pioneers in this direction. Where in 1908 there were only 10 herds under this scheme, by 1922 there were more than 300. In conjunction with the Shorthorn Society the Dairy Shorthorn Association provided a grading-up scheme, whereby the female produce of an approved and inspected cow might ultimately be entered in Coates' Herd Book (5a).

Bulls were now available for export from tested cows, and Major Buxton, president of the British Dairy Shorthorn Association and a member of the council of the Shorthorn Society of Great Britain and Ireland, who made a tour of New Zealand in 1924, laid before the council of the New Zealand Milking Shorthorn Association a plan which he thought might develop a market in New Zealand for this type of animal. Besides helping the British breeder by finding a new market for him, there was a possibility that the two New Zealand societies by this arrangement might lose their antagonism and work together along friendly lines as did their sister societies in Britain. Major Buxton proposed to approach some of the most important breeders of Dairy Shorthorns in Britain and persuade them to donate, or offer at a much-reduced price, suitable bull calves to the New Zealand Milking Shorthorn Association by way of an advertisement for British stock. These would be shipped as calves to New Zealand and sold by auction on their arrival. The proceeds of the sale would be held by the New Zealand Milking Shorthorn Association and used as the nucleus of a fund for the importation of a further shipment which would be purchased in Britain at market rates. This scheme was adopted by the council in March, 1924, and a sum of £500 was voted to defray the expense of importing 10 bull calves. One of the members of the council, Mr. J. Bateman, Invercargill, was actually on his way to England to superintend the importation when an embargo on the importation of stock by the New Zealand Government caused the scheme to be abandoned.

Resumption of Imports

After the unfortunate failure of Major Buxton's scheme, 15 years elapsed before a British Dairy Shorthorn bull was landed in New Zealand. In 1939 Mr. L. Barkla, of Hawera, imported Histon Wildeyes Bandmaster, bred by Messrs. Chivers and Sons, Histon, Cambridge. This bull had a good milk-record pedigree and his three nearest dams averaged 12,013lb. milk in 328 days. His sire, Chickenham Bandmaster, was a qualified bull with 19 qualified daughters and his dam, Sally Wildeyes, was a qualified bull breeder by milk yield.

Shortly after this Mr. A. W. Hurford, Doyleston, Canterbury, imported the British Dairy Shorthorn bull Iford Cartoon 23rd, bred by Messrs. J. and H. Robinson, Iford Farms, Lewes, Sussex.



[Point Blank Press Co., Ltd. photo.

Mr. L. Barkla's Histon Wildeyes Bandmaster (imp.).

This bull had an excellent milk-record pedigree. His sire, Iford Lawrence 4th, was a register-of-merit sire under Dairy Shorthorn Association regulations, having 77 qualified daughters up to October, 1938. His dam, Iford Cactus 42nd, was a qualified bull breeder, having a record of 14,631lb. milk on her third calf, and his 7 nearest dams' records averaged 10,853lb. milk.

About the same time, Miss Breen, of Hastings, imported a bull, Effjay Sapphire's Treasure, bred by Wing Commander F. Fielding-Johnson, Calne, Wiltshire. This bull also had a good milk-record pedigree, but was not eligible for Coates' Herd Book, owing to the fact that the pedigree of his dam Sapphire was either too short or non-existent. Had her calf been a heifer, it would have been eligible for registration under the British Dairy Shorthorn Association's grading-up scheme; as a bull calf it was not, nor was it eligible for entry in the New Zealand Milking Shorthorn Herd Book under the existing conditions of entry. However, Sapphire had just put up a new world's record for daily yield—131¾lb. of milk in 24 hours, finishing her lactation by producing 26,677lb. milk in 418 days, an average of 63lb. per day. This excellent record was taken into consideration when Miss Breen applied for registration. After considerable discussion it was agreed to relax the conditions of entry and admit Effjay Sapphire's Treasure to the New Zealand Milking Shorthorn Herd Book. The council's decision was influenced by the fact that some old foundation cows were still leaving bull calves with pedigrees just as short as that of the bull under discussion, and these were eligible for entry in the New Zealand Milking Shorthorn Herd Book. One of the leading breeders had used such a bull for stud purposes. He had followed this bull with another out of the same cow (Riverdale Florrie 2nd), was still using this bull, and was proud to advertise the fact.

Miss Breen's Effjay Sapphire's Treasure (imp.).

Riverdale Florrie 2nd's Record

Riverdale Florrie 2nd, bred by Mr. T. Wardlaw, Bay of Plenty, tested at the age of 11 years, had a C.O.R. of 17,360lb. milk, 761lb. fat. She was purchased at Mr. Wardlaw's dispersal sale by Mr. J. McGowan, Waiuku, Auckland, for 62 guineas. Mr. McGowan continued to test her, and her production probably constitutes a record for the

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5a. "Shorthorn Breeders' Guide" (1923), page 34.

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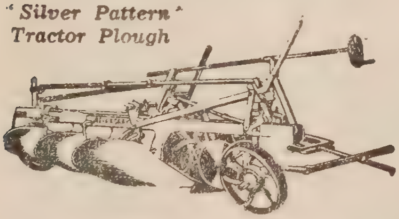

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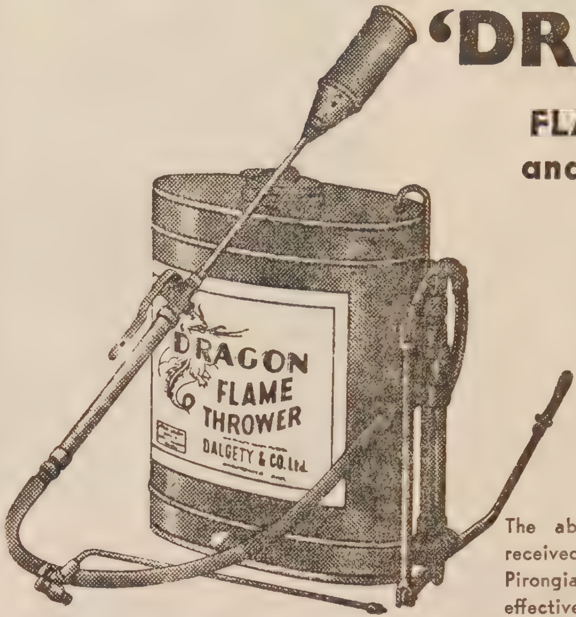

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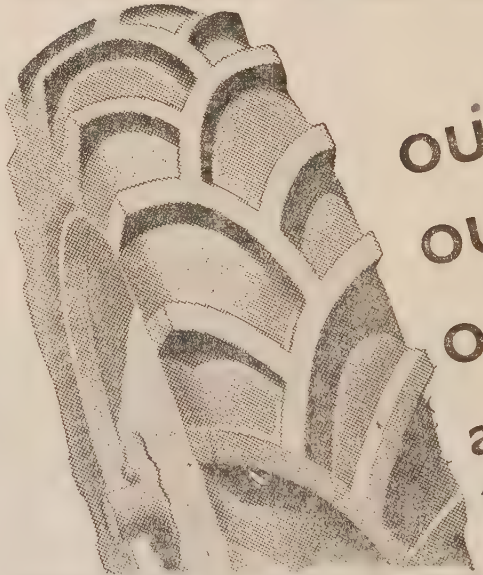

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Miss Breen's Mahora Sunbeam; Lifetime Production Certificate 4019lb. fat, G.H.T. 728lb. fat in 352 days.

Dominion. Starting at the age of 11 years she gave:—

Season	Fat lb.
1928-29	*761 in 365 days
1929-30	612 in 275 days
1930-31	628 in 312 days
1931-32	642 in 365 days
1932-33	696 in 365 days
1934-35	635 in 345 days
1935-36	615 in 362 days
1937-38	628 in 338 days
	5,217

* C.O.R.; other tests G.H.T.

If her previous lactations had been recorded and added to the total, it would have been hard to surpass. At 17, at the Royal Show, Auckland, Riverdale Florrie 2nd was awarded the British Dairy Shorthorn Association's Challenge Cup, judged on type and production combined.

Outstanding Non-pedigree Cows

So far, with the exception of the Dilworth herd, no mention has been made of the non-pedigree foundation cattle in the herds around Auckland. Practically none of these was registered until 1919, when volume 3 of the New Zealand Milking Shorthorn Herd Book appeared. Included in volume 3 are two foundation cows about which no information is given except their colour (red), but both were destined to play a very important part in the development of the breed in New Zealand. The first, Glenthorpe Lady, entered and tested by Mr. A. J. Melville, Buckland, C.O.R. 20,132lb. milk, 856lb. fat, has been mature class leader since she made her record in 1923. Her blood has been very widely spread throughout New Zealand by her grandson, Muriwai Pride. The second, Pukekite Rangi, entered and tested by Mr. Robert King, Buckland, C.O.R. 12,902lb. milk, 605lb. fat, was purchased by Mr. G. N. Bell, Palmerston North, who retested her, this time gaining a C.O.R. of 13,365lb. milk, 622lb. fat. Her blood was very widely dispersed through her son Pukekite Rangitira.

Many of these non-pedigree foundation cows must trace back to the dispersal of the stock of the New Zealand Stud and Pedigree Stock Company of Auckland. This company registered in volume 1 (new series) of the New Zealand Herd Book of Short-horned Cattle, published by the Canterbury Agricultural and Pastoral Association, 1884, about 70 females, nearly half of which were imported. Judging by the herd book entries, the company appears to have purchased the whole of the studs of Messrs. R. and E. McLean, Bleak House, Auckland, and Mr. T. Morrin, Wellington Park, Auckland, who were the leading Auckland breeders at that time. The company seems to have gone out of business shortly after its inception, and neither the writer nor the committee set up to help him has been able to trace any of the cattle.

That they are not alone in this respect is proved by the following extract from A. Turnbull's "History of New Zealand Pedigree Shorthorn Cattle" (1949):—

> What became of these cattle, or who comprised the personnel of the company, is a complete mystery. A specially keen search by the writer when visiting Auckland failed to solve the problem. The Auckland Deeds office advised that the volume concerning the company was still missing after an intense search. Similarly at the Lands and Deeds office advice was that certain deeds relating to the company were missing, the explanation here being that in rebinding the volume the binders had evidently misplaced these deeds and replaced them with a blank page! However, other deeds gave the information that the company had in 1883 taken over 732 acres near Auckland and 8863 acres bordering the Waikato River from the Auckland Agricultural Company and had in 1886 resold these properties to the vendors. Whether the Stud Stock Company went bankrupt is not ascertainable, but it may well have been so if the results of their cattle-breeding operations are any guide. What became of all these cattle it is now impossible to say. Certainly the great majority of them have disappeared without a trace left in any existing Herd Book. It may be that a few were exported, as is shown by the following condensed report taken from "The Auckland Weekly News" of August 9, 1884:—
>
> "On the 30th July the New Zealand Stud and Pedigree Stock Company forwarded by the s.s. Rotomahana one of the most important shipments of pedigree cattle and sheep to Brisbane that has left these shores for some time. The consignment consisted of 23 Shorthorn and Hereford bulls and cows." The following report taken from a mid January issue of the paper of 1885 seems to shed a good deal of light on the probable fate of a majority of them:—"A draft sale of the New Zealand Stud and Pedigree Stock Company's Shorthorn and Hereford cattle was held at Remuera on the 6th January, 1885. The demand for cattle was very slack indeed, a very large proportion of those offered finding no purchasers. Four bulls were offered including the Duke of Newcastle, which won the Blue Ribbon in Australia some years ago and for which 1,500 guineas was offered and refused. On Tuesday there was no bid, beyond the moderate reserve of 50 guineas, so he was passed in. Mr. J. C. Firth bought two fine 2-year-old Shorthorns at 85 and 75 guineas respectively and a white youngster 10 months old, showing plenty of quality, was bought by Mr. James Gould for the moderate sum of 20 guineas. The highest bid obtainable for yearling Shorthorn heifers was 12 guineas, at which two were purchased by Mr. R. C Greenwood. All the others were passed in, there being no bid above the reserve of 5 guineas. Twelve 2-year-old heifers were all passed in, there being no bidding. The Shorthorn cows brought prices ranging from £10 to £7-15-0."

Artificial-breeding Trial

Since those previously mentioned there have been a few more importations from Britain and Tasmania.

Messrs. G. D. Hall and Son's Pinedale Stylish Lilac, V.H.C.; C.O.R. 618lb. fat as a senior 4-year-old; Lifetime Production Certificate 4228lb. fat.

Messrs. G. D. Hall and Son's Pinedale Matchless; C.O.R. 697lb. fat, Lifetime Production Certificate 4083lb. fat.

There has been none from Australia because of the embargo, which is not likely to be lifted owing to the prevalence of pleuro-pneumonia in the Commonwealth.

The president of the Australian Illawarra Shorthorn Society, Mr. Graham Shirley, while on a visit to New Zealand in 1947, arranged with a few of the North Island breeders for an experiment in artificial breeding. With the cooperation of the New Zealand Department of Agriculture this took place in 1948, thus overcoming the embargo.

Mr. Shirley lent his bull, Camelot Victory, free of charge, and semen for artificial insemination was flown from Sydney to Auckland. The experiment was successful and a few live calves were born. It remains to be seen whether further advantage will be taken of this latest addition to breeding practice.

Another innovation has been the opening of a polled section of the herd book. Permission has been given for the introduction of the polled character through the use of American Polled Shorthorn blood, but to date this movement is only in the experimental stage.

Support for Herd Improvement

In its endeavour to keep abreast of the times the New Zealand Milking Shorthorn Association has supported the Official Sire Survey and the Lifetime Merit Register of the New Zealand Dairy Board's Herd Recording Council. In sale catalogues records from the above are given prominence and compare favourably with those of the other dairy breeds. For instance, Mr. N. J. Ward, Canvastown, has 5 "Elite" cows by one sire, Matangi Superfine 15th, in the Lifetime Merit Register. These 5 cows have an average lifetime production of 5188lb. fat. One of the best bulls disclosed by the Sire Survey was Kereone Eclipse, bred by Messrs. R. D. Cochrane and Son. This bull, surveyed in the herd of Mr. A. E. Bates, Rototuna, has the following final figures to his credit:—

15 dams, 7300lb. milk (4.3 test), 316lb. fat.

15 daughters, 8180lb. milk (4.61 test), 377lb. fat.

29 daughters, 7820lb. milk (4.66 test), 364lb. fat.

Classification Scheme

In 1925 registration conditions were relaxed to the extent that the inspection for type was abandoned and entries were accepted on pedigree records alone. The result was that, though a standard of excellence with a scale of points for judging Shorthorn type and character had been drawn up and published in volume 8 (1927), breeders interpreted this scale according to their own ideas. To overcome the lack of uniformity of type that had been evident since the formation of the association, and still persisted, a voluntary classification scheme was adopted, and in volume 16 (1944) the first list of classified cows appeared. Cows, 4 years of age and over, were classified according to type into classes V.H.C., H.C., and C. by classification committees comprising two official judges and the official inspector for the association.

In volume 17 (1947) a register of "S.B." cows (superior breeders) was opened. To qualify it is necessary for a cow to have two or more daughters either in the Lifetime Merit Register or that have produced at least 150lb. fat above the standard, and such daughters must have been classified V.H.C. or H.C.

The ideal of the association is a 1000-gallon cow with a test of 4 per cent. or more. This should be possible, as according to a survey made recently by the secretary, the average production of all Shorthorn cows that have been under C.O.R. test is above this standard. The survey also showed that the number of Shorthorn cows over 13 years of age under Group Herd Test was greater than the total of cows of that age of all the other breeds under test.

Group Herd Test has been well supported and several Shorthorn herds have led their districts, as well as being among the tops in the Dominion, averaging up to 468lb. fat per cow with individual records up to 827lb. fat.

Present Position

Philpott, 1937, (16) gave the number of cows in milk and dry in 1908-1909, when the first cow-testing association was formed and the cows tested were just about all Shorthorns, at 536,629. By 1935-36 the number had increased to 1,951,507. Hamilton, 1944, (17) said:—

> Initially the most important breed of dairy cows in New Zealand was the Shorthorn, but with the adoption of more intensive methods the Jersey breed has progressed at the expense of the lower-testing breeds until today it is estimated that 75 per cent. of all cows in milk are grade Jerseys.

From the above it appears that all the increase in the cow population has been made by the increased number of grade Jerseys, but it should be remembered that most of these grades carry varying amounts of Shorthorn blood.

With the expansion of the dairy industry the Milking Shorthorn has not increased in numbers to the extent that its supporters would have wished. However, interest has been well maintained by the members of the New Zealand Milking Shorthorn Association, who at present number 470. Local branches of the association have been formed throughout New Zealand, 5 in the North Island and 3 in the South Island.

Many of the members have gone in for town supply, Shorthorn milk being deemed very suitable for this purpose; indeed, several of the members have contracts to supply their local hospitals. Shorthorns have been used in all districts to break in difficult farms, where the steers have a definite value, as has the extra milk for feeding pigs and calves, and some of the top-testing herds have been built up from such beginnings as conditions improved. Wherever Shorthorns are under really good conditions they are among the top herds of their districts.

Acknowledgments

Acknowledgments are made to Mr. C. Munnings, president of the New Zealand Milking Shorthorn Association and secretary of the Canterbury branch, and Mr. A. W. Green, past president and secretary of the Waikato branch, for making available early minute books and catalogues; to the Hocken Library, the Alexander Turnbull Library, Canterbury Agricultural College, Ruakura Animal Research Station, the Shorthorn Society of New Zealand, Messrs. J. C. Wright, R. Peach, N. J. Ward, and W. Law (past presidents of the association), Mr. Graham Shirley, president of the Australian Illawarra Shorthorn Society, Professor Riddet, Dr. H. E. Annett, Messrs. A. Turnbull, Earle Vaile, G. Salway, and John Taylor for the loan of reference books and for data supplied; and to those who furnished photographs.

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16. Philpott, H. G. (1937): "A History of the New Zealand Dairy Industry, 1840-1935," page 403.

17. Hamilton, W. M. (1944): "The Dairy Industry of New Zealand," page 53.

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Pullets are more Profitable than Hens to the Household Poultry Keeper

AMATEUR poultry keepers frequently ask how long a fowl should be kept, and a common answer is "Two years." In this month's article for the household poultry keeper W. L. McIver, Poultry Instructor, Department of Agriculture, Hamilton, shows that that reply is more likely to be wrong than right and recommends the householder to keep pullets in preference to hens.

[*Fraser Niederer photo.*

This pullet ended its laying year and moulted early in February. It would not resume laying for at least 3 months, meantime eating about 19lb. of mash and grain.

IN too many household poultry runs fowls are kept until they die natural deaths. In a few cases they are granted the mercy of a sudden end, but most of them linger on for weeks or months before death ends their suffering. That is inhumane, and all poultry keepers should kill seriously ailing birds promptly. Killing by dislocation of the neck is quick and painless, and the method was illustrated on page 437 of the "Journal" of November, 1949. People who shudder at the thought of killing a sick fowl should think of the unnecessary pain they would cause by leaving it alive. If the thought of allowing continued suffering is not enough to induce them to kill the bird, they should consider the economic aspect, because ailing fowls usually go off the lay quickly and afterward are uneconomic.

Lower Production Each Year

Fowls lay fewer eggs each year than in the previous year, so a flock will not produce in its second year the same total of eggs and profit as in its pullet year. Nevertheless, all birds are not unprofitable in their second and subsequent years, for some pullets are such good egg producers that they will lay a high total during the next year, when they are technically hens; in fact, some hens lay a larger number than the average pullet. These birds obviously are worth keeping a second year and a few even longer.

An experienced poultry keeper can recognise such birds by exterior characteristics, but most householders cannot distinguish one fowl from another. In any case, a commercial farmer has to keep an adequate number of older fowls from which to breed, as immature pullets should not be used for breeding. Probably because these farmers keep hens for a second year, most people have the impression that fowls should be retained for 2 years—neither more nor less—but that view is wrong.

Some pullets are not good enough to keep for a complete year, and a few hens can be profitable for several years. However, to be a really paying proposition the hen must be a late moulter and must resume laying quickly after the moult if she is to compete with pullets, which offer the advantage of beginning to lay in autumn and continuing during winter when egg prices are at their highest.

Cost of Feeding through a Moult

Even if the householder is adept at culling or has a knowledgeable friend, hens are less profitable than pullets when feeding costs are taken into account. Some people contend that feeding a fowl through the moult is cheaper than rearing a chicken to maturity because a bird takes only about 12 weeks to moult and resume laying but a chicken takes about 24 weeks to reach maturity and lay, but they overlook difference of food intake.

The moulting bird is fully grown and has an adult appetite, even if it is less during the moult and while the bird is out of production. While the fowl is dropping feathers it eats less than normally, but while regaining feathers it eats heartily and strives to build up a good body reserve of fat before spring. Allowing for table scraps fed to the fowls, a hen will eat about 19lb. of mash and grain during the moult; the early moulter might eat more, the late moulter less. The growing chicken eats very little in the early weeks and a total of about 24lb. of food by the time it begins laying, but the cost of this extra 5lb. of food is repaid rapidly by the increased value of winter eggs. Before the present system of one price for eggs in winter and another in summer, involving only two price alterations yearly, two summer eggs equalled one winter egg in value; even now winter eggs are one and a half times as valuable.

Keeping Birds for a Second Year

The situation is complicated further when fowls are kept for a second year. If no culling is done some pullets are certain to die during the year. Most farmers admit to 8 or 10 per cent. of mortality among pullets, but the New Zealand average is likely to be double that. That means that insufficient birds are left at the end of the first season to fill the hen house and the family's supply of eggs for the next year is reduced.

If the birds are culled properly, the egg supply becomes worse. Only 45 to 50 per cent. of the pullets still alive at the end of the first laying year are worth keeping another year. That is, an average of only 5 out of 12 pullets originally placed in the laying house are worth keeping a year later. If 12 pullets were needed to supply the family's egg requirements, what chance have 5 hens of meeting the quota?

Buying a few replacement pullets each year and running them in the same house as the hens is not a good method. Apart from the fact that older birds bully young ones, hens and pullets require different ratios of proteins to carbohydrates in the diet during late summer, autumn, winter, and early spring.

Cost of Replacements

The cost of replacement birds has a large effect on the comparative profitableness of pullets and hens. The accounts will vary considerably according to whether the stock is bought at a day old, at 6 or 8 weeks of age, or at 4 or 6 months.

A low-priced first-year hen at 5s. to 7s. 6d., even if it gives fewer eggs laid mainly in spring and summer, can compete favourably with a pullet bought near maturity at 20s. to 27s. 6d., but if day-old chickens or reasonably priced perching pullets are bought, more profitable results can be expected from keeping all pullets from one year than from hens or a combination of hens and pullets.

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Pasture Seed Crops and Seed-potato Varieties

SEASONAL NOTES Contributed by the EXTENSION DIVISION

A BROAD outline of the normal management practices required for pastures intended for seed production is given in this month's notes, but local and seasonal conditions may necessitate certain modifications. Advice on these may be obtained from Instructors in Agriculture in the various districts.

* * *

PERENNIAL RYEGRASS Paddocks for perennial ryegrass seed crops should not be closely grazed during late autumn, winter, and spring. If growth is backward, it is advisable to remove stock toward the end of September and to apply 1cwt. of sulphate of ammonia at that time. Under average conditions the area can be grazed until mid-October, though, if conditions are favourable for quick growth, grazing may be carried on into November.

* * *

ITALIAN RYEGRASS It is seldom that any but a first-season crop of Italian ryegrass is saved for seed; it is usually sown in early autumn after a summer fallow. Grazing is carried out during winter and early spring, but at no time should it be severe. Concentrated stocking for short grazing periods is advisable. Paddocks are usually closed from stock in late September or early October.

* * *

WHITE CLOVER Areas intended for white clover seed crops should be well supplied with lime and top-dressed with superphosphate in autumn. Even grazing should be practised during autumn and winter, as it is advisable to keep growth down to about ½in. No hard-and-fast rules can be laid down regarding the best time to close paddocks from stock, but it will usually be found necessary to keep the area closely grazed until the first flower heads appear. If excessive growth occurs after fields are closed, the crop may be grazed with a big mob of sheep or topped with the mower.

* * *

MONTGOMERY RED CLOVER In most cases Montgomery red clover areas intended for seed production are lightly grazed in early spring and then stock numbers are increased with the flush of growth in October and November. Stock are removed toward the end of November. Paddocks which have been handled in this way should be topped with the mower if grazing has been uneven. On heavier land a hay crop may be taken before the paddock is closed for seed in early December. Topdressing with superphosphate increases seed yields and hastens maturity.

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COWGRASS Cowgrass makes earlier spring growth than Montgomery red clover and it is usual to take a hay crop before closing paddocks for seed production.

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POTATO VARIETIES If any prospective potato grower were to look through the apparently unending list of potato varieties and synonyms for a choice of what to plant, he might well be bewildered. In New Zealand farming practice, however, the number of varieties of real commercial importance does not reach double figures, though a few more are of significance as a source of seed tubers for the garden trade.

AUCKLANDER SHORT TOP The most important variety is Aucklander Short Top, which is grown to produce about one-third of the Dominion's crop. This variety is the main one planted in the lighter soils of Canterbury and also in the North Island for digging from December onward. It is of good quality, produces a high proportion of table tubers even under unfavourable conditions, and withstands blight attack fairly well. On heavier soils it is prone to produce misshapen tubers. The chief defect of the variety is the liability of the tubers to mechanical damage during handling and subsequent infection by dry rot fungus.

* * *

ARRAN CHIEF Arran Chief is the next most important variety, it being most widely grown on the heavier Canterbury soils and in Otago and Southland. Very heavy yields can be obtained on the best soils, but on lighter soils where Aucklander Short Top does well Arran Chief produces a large number of small tubers. The variety is subject to late blight attack. The tubers are firm-skinned and do not bruise as easily as some varieties, so that there is less storage loss due to this cause.

* * *

DAKOTA Dakota, a red-skinned variety, is next in importance, and is the only coloured variety grown on a commercial scale. It is seldom grown on other than the light to medium Canterbury soils. The variety is later in maturing than Aucklander Short Top, and, contrary to most other varieties, its quality appears to improve during storage over the winter. It is consequently most sought after late in the season, but is not favoured for use immediately after digging. The tubers have very deep eyes, a disadvantage when preparing them for the table.

* * *

ARRAN BANNER Arran Banner is, in maturity, equivalent to Aucklander Short Top, but it has a place in New Zealand because it can be dug before the latter is ready. Thus it is grown commercially in the South Island as a second early, but more particularly to supply seed for garden and North Island commercial plantings. The crop from the latter is marketed mainly before Christmas.

Though its quality is good when tubers are immature, quality falls away rapidly with maturity. Large tubers are prone to hollow heart. It is subject to late blight, but is not frequently grown under conditions where this disease assumes significant proportions.

* * *

OTHER VARIETIES Plantings of the King Edward variety are confined almost entirely to Otago and Southland, where it yields better than it does elsewhere. Crops of King Edward generally are used before the Arran Chief crops are ready for lifting. Inverness Favourite is grown sometimes as an alternative to Arran Chief, while Aucklander Tall Top, which is similar to but later maturing than Aucklander Short Top, is grown to a limited extent on areas also suited to the latter, but where the late summer moisture supply is more assured. The main use for Northern Star today is in association with the system of potato growing employed in the Pukekohe district. Elsewhere it is not favoured. Other varieties, such as Epicure, Jersey Bennes, Cliff's Kidney, and Majestic, are little grown except to supply seed for private gardens. Several varieties of more recent introduction are being grown on a small scale, but there is little evidence yet to recommend them unreservedly in preference to standard varieties.

THE SMALL MILK-TREATMENT STATION

WITH the impetus given over the last few years to the bottling and pasteurisation of milk for town consumption many producer-venders throughout the Dominion desire to advance with the times, and, where a central depot does not exist, to provide bottled and pasteurised milk for their customers. Unfortunately some producer-venders think that there is a fortune to be made out of the margins allowed for the extra service, but this is not so, as it costs a good deal of money to erect a milk-treatment station and provide the necessary units of plant. This article by S. J. Cowen, Market Milk Instructor, Department of Agriculture, Palmerston North, in dealing with this subject, gives details of the experience of a young producer-vender in tackling the problem.

IN practically every case where a milk-treatment station has been started the throughput has increased so rapidly that the units of plant installed have proved totally inadequate for the work required of them. The result is that long hours have to be worked with a very poor return on the basis of hours of labour.

With the present organisation provided by the Dairy Division of the Department of Agriculture the approach to each individual's problems can be dealt with separately. Dairy Division officers help in making a survey of a whole district and from information collected can advise on the size of equipment to install.

The small milk-treatment station described in this article. It is compact and adequate to handle its throughput of 500 gallons a day.

In many small towns the remuneration will depend on the efficiency of the owner, his willingness to work, and, above all, his organising ability.

The experience of a young producer-vender in a town with a population of about 5000 is given as an example, and may provide other operators of small milk-treatment stations with a useful basis of comparison.

The producer-vender referred to started out in September, 1939, with a round of 29 gallons per day. He got up at 2.30 a.m. to milk the cows and then in a room adjoining the milking shed he filled and capped the bottles, which had already been washed by hand.

About December, 1939, a motor-driven bottle-washing brush was installed, together with a hand capper and a small direct-expansion surface milk cooler of a rating of 30 gallons per hour.

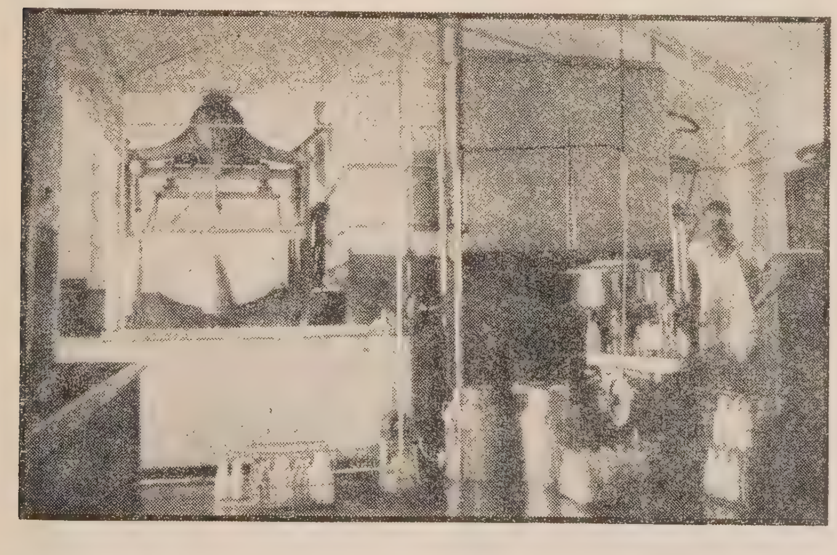
In November, 1941, he shifted from the farm into town and installed the plant in a room, 16ft. by 16ft., in which space a cool-storage room, 4ft. by 3ft., with cooling unit was included. The output was now about 40 gallons per day, but in relation to this figure was the fact that about this time a number of very small producer-venders gave up their rounds and the milk was bottled at the depot.

In 1942 the cooler capable of 30 gallons per hour was replaced by a unit of 60 gallons per hour of the same type and a 4 h.p. vertical boiler was installed together with a 2-bottle hand filler and capper.

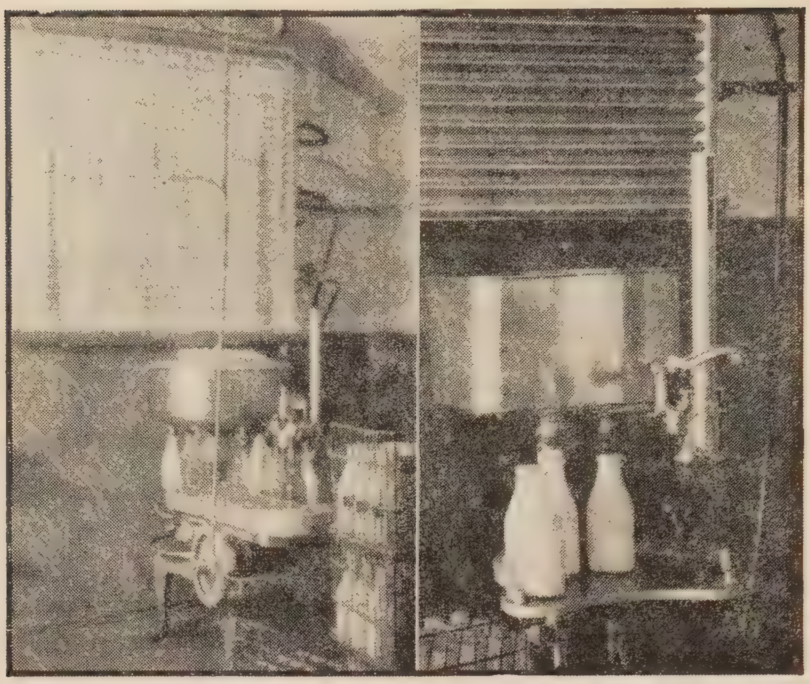
In 1944 a 10ft. lean-to was added to the existing building, thus making the dairy 26ft. by 16ft., and at the same time a new cool-storage room, 7ft. by 6ft., was constructed and the refrigeration units installed in the old room. A 150-gallon batch pasteuriser of American manufacture was installed, the daily output now being 100 gallons.

Extensive Alterations

Early in 1945 pasteurisation of milk for the town trade was initiated. It was quickly found that the 4 h.p. vertical boiler was too small, so it was replaced by an 8 h.p. portable boiler which was installed in a special room erected against the back of the existing building. This new boiler room was 25ft. by 9ft. with a wood-drying and storing room, 25ft. by 4ft. A further section, 26ft. by 20ft., was also added to the main dairy building, giving a processing space of 36ft. by 26ft. The cool-storage room was increased in size by 9ft. by 6ft., giving an oblong room, 16ft. by 6ft., inside measurements, with a door at each end. A new Australian bottle filler rated at 300 gallons per hour was installed together with a new milk cooler and suitable refrigeration units capable of



The processing and bottling room with the milk-reception stage in the background.



When the gallonage handled daily was small the capacity of the milk-cooling and semi-automatic bottle-filling machines (right) was adequate, but with double the throughput larger-capacity cooling and filling machines (left) were needed.

cooling just over 220 gallons of milk per hour from 145 degrees F. to 40 degrees F. The cooler was made with pear-shape tubes 5ft. in length. The two top sections of the cooler have 7 tubes each with a separate water inlet and outlet, while beneath them are two direct-expansion sections, the top one containing 8 tubes and being connected direct to a 3 h.p. compresser unit, the bottom section comprising a set of 6 tubes and being connected direct to a 2 h.p. compresser unit. A rotary spray-type bottle washer was also installed with a rated capacity of 200 gallons per hour. The bottles are washed as they are returned off the rounds.

In 1947 a milk-reception platform, 15ft. by 9ft., was erected and a set of milk-weighing scales installed. A steam turbine centrifuge was installed at the same time together with other equipment to carry out butterfat tests, while a methylene blue bath for reductase tests, a sediment tester, and a lactometer for solids-not-fat tests were also acquired and put into use. These provided the basis for a satisfactory range of tests to be carried out on the incoming milk.

By February, 1948, the last loose milk vender in the town arranged to have his milk bottled and to provide his customers with pasteurised milk where required. By July, 1949, all the milk required for the town was bottled and by this time the daily throughput had risen to 500 gallons.

Increase in Throughput

Owing to the increase in throughput. it became evident to the owner that in the interests of efficient management he should separate the operation of the milk-treatment station from his vending rounds. This arrangement took effect in July, 1948, and since that date the station has been operated separately by the owner and one assistant.

The first load of milk arrives at the milk-treatment station between 7.30 a.m. and 8 a.m. A fire is put on the boiler about 7 a.m. and a full head of steam is ready to heat the first batch of milk. It takes about 15 minutes for the temperature to be raised to 145 degrees F. and the milk is held at this temperature for 30 minutes before it is pumped over the cooler, capable of handling 220 gallons per hour, and filled into the washed and sterilised milk bottles.

The rate of flow is governed by the cooler and for this reason it takes about ¾ hour to empty the batch of 150 gallons so that the complete treatment of this quantity takes 1½ hours in all for the three jobs of filling the batch, heating and holding the milk, and emptying and cooling it. As the filler can fill faster than the cooler operates, one person can operate the machine quite satisfactorily, and at the same time take the filled crates into the cool room.

Pasteurising Process

Two batches of milk are pasteurised each day, 3 hours being required to do just over 300 gallons. The remaining 200 gallons are chilled and bottled as raw milk and the whole day's work is completed by midday. It will be noted that only one man is mentioned; the other looks after the job of receiving the milk and grading, sampling, and recording the milk weights. He also washes the cans and the dirty bottles and looks after the boiler. The whole operation of the milk-treatment station is thoroughly organised and the work performed by the owner and his assistant is carefully integrated so that they are both working to the fullest advantage.

The fact that the work is completed by midday means that the owner has time to keep the premises spotlessly clean and the plant in good working order.

By putting in another batch pasteuriser the time lag between the first and second pasteurising process could be eliminated so that an increase of 200 gallons a day in the throughput could be easily handled without any extra time being worked.

The building is not elaborate, but the first small building was so placed that extensions could be added later without interfering with the operation of the plant. Because of the foresight shown by this dairyman the units of plant installed were large enough to give full-time employment for the two men operating the plant.

Suppliers to Dairy

There are 14 registered suppliers to the dairy and each one takes a pride in the quality of milk he provides. The owner of the treatment station, while maintaining such co-operation, fulfils his own responsibility by maintaining the highest possible standard of efficiency and cleanliness in the dairy itself, the premises being always spotlessly clean and painted and a credit to all connected with the milk industry in the town.

The venders of milk from the station provide their vehicles with properly constructed covers so that they also do their part in maintaining the high standard of the milk. In short, the work of farmers, carriers, treatment-station operators, and venders in the town synchronises perfectly in the supply to the local residents of high-quality milk.

Persons interested in the installation of a processing plant should keep in mind that small units of plant give a very small return for the hours worked, but that capital costs per gallon handled decrease as the quantity handled increases.

For this reason one large plant in a town is more economical than two small ones. Correct selection of plant for processing the throughput is essential, the choice of suitable and adequate premises being equally important. The site for the building should be of ample size and allow for good drainage, with good accessibility and an adequate supply of good water.

The establishment of a new milk-treatment station or the replanning of an existing one is a specialised undertaking, and dairymen contemplating such a project are well advised to discuss their problems with the local officer of the Dairy Division, Department of Agriculture, at as early a stage as possible. Milk processing in a small milk-treatment station is no short-cut to wealth, but sound advice can minimise some of the more restricting hazards which so easily lead to heavy financial set-backs.

THE HOME GARDEN IN AUGUST

By S. O. GILLARD, Vegetable Instructor, Department of Agriculture, Auckland.

IN most districts August is considered as the beginning of the gardening season and with the onset of spring many gardeners hasten to get crops established. However, even in early districts there is no urgency for extensive sowings in August, and disappointments often can be avoided by paying particular attention to the state of the soil. Tilth and soil moisture are important, and soil that will stick to boots when walked on is not in a favourable condition for sowing and planting. As soil warmth is most necessary for seed germination and the growth of young plants, little is gained and often much lost by sowing and planting while the ground is still wet and cold. Only the warm positions in the garden should be utilised at this time of the year.

PROVIDED soil and climatic conditions are satisfactory, small sowings may be made of the more hardy kinds of vegetables, such as parsnip, turnip, radish, beetroot, onion, spinach, silver beet, peas, lettuce, salsify, summer cabbage, early cauliflower, and parsley and other herbs, and where conditions are not too severe cabbage, cauliflower, lettuce, and a few early onions may be planted out. In colder districts some protection must be given to the young plants by using cloches or wooden boxes with sheets of glass placed on top. To increase the soil warmth the protection should be placed in position 10 to 14 days before planting is done. The soil around growing crops should be aerated by cultivation.

Most gardens will still have a good supply of cabbage and broccoli and cauliflower, silver beet, and spinach should still be available. Autumn-planted cabbage and cauliflower should now be at a stage when an application of liquid manure will benefit them by promoting further growth. Nitrate of soda, or sulphate of ammonia, 2oz. in 4 gallons of water, may be applied at the rate of 1 pint of the solution to each plant.

Broad beans planted in May should have made good growth by now and will be at the stage where the earth can be moulded up to plants to help support them. When plants have reached the full-flowering stage it is an advantage to pinch out the terminal shoot, as this checks their growth and induces them to set pods more readily.

Retarding Seed-stem Development of Root Crops

Toward the end of August root crops such as carrots and parsnips tend to run to seed. This growth can be retarded considerably by wrenching. This may be achieved by pushing a fork or spade into the soil alongside the row and gently levering the roots up slightly. This breaks the extreme end of the taproot and consequently retards the growth of the plant.

Kumaras

Although most home gardeners purchase their kumara plants from seedsmen, they may be raised in a box during August or early September. The box should be about 9in. deep and a convenient length and width and filled with equal parts of good light soil and sand. The tubers are set about 3in. deep and should be kept moist. The necessary soil warmth to promote growth may be induced by placing the filled box in a sunny position and covering it with a sheet of glass. The tubers shoot from the eyes, and as soon as the shoots have developed small roots of their own they should be removed and planted into their permanent position or replanted into another box until required. If plants are removed early another batch of plants will soon develop. About a dozen tubers will supply enough plants for the average home garden.

Peas

In the warmer parts of the North Island sowings of peas will have been made already, and provided conditions are favourable, a sowing can now be made in most districts. To maintain a succession varieties of similar maturity periods should be sown at regular fortnightly or monthly intervals, or several varieties such as William Massey, Onward, and Stratagem, which mature in that order, may be sown at the same time. Except for very early crops or when the soil is poor no additional manures should be needed. For early crops and in very poor soils a mixture of superphosphate 3 parts, blood and bone 1 part, and sulphate of potash 1/20 part (all by weight) sown along the rows at the rate of 8oz. to 9ft. of row and thoroughly mixed with the soil a few days before sowing the seed will be found to improve the yield.

When sowing seed make a trench 2in. deep and 5in. wide with straight walls and scatter the seed about 1in. apart in the bottom of it. The rows should be 30 to 36in. apart. One pound of seed is sufficient to sow up to 100ft. of row.

As a protection against birds and harmful insects in the soil the seed may be given a coating of kerosene and red lead powder. This is done by placing the seed in a shallow tin or similar container, dampening the seed with kerosene, sprinkling red lead powder over it, and shaking the container backward and forward, adding sufficient red lead until the seed is thinly coated and reddish; seed should then be spread out to dry before sowing.

As another protective measure against birds which scratch up and eat the seeds a strand of black cotton can be stretched taut along the pea row. This is best placed 2in. from ground level and supported by thin sticks placed at intervals of about 4ft.

Varieties: For early sowing the best varieties include William Massey, Blue Bantam, Little Marvel, and Earlicrop; suitable main-crop varieties are Greenfeast, Stratagem, and Commodore. Of the tall-growing peas which will require supports good varieties include

[*Sparrow Industrial Pictures Ltd. photo.*

Blue lupins dug in make good humus.

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Parsnips

In the lighter soils a small early sowing of parsnips may now be made. This useful vegetable should always be grown in the garden where soil conditions necessary to its successful cultivation are available. Tender, well-grown parsnips are always popular. Roots can be lifted as required before attaining their full size, thus thinning out the row and leaving the remaining plants to grow on to maturity.

Ground which was heavily manured for a previous crop should be selected for parsnips. If fertilisers are necessary, they should consist of equal parts of bonedust and superphosphate, but fresh manure must not be used. As parsnip seed quickly loses its viability, it should be sown thickly to ensure a good strike. In heavy soils fine leaf mould makes a good covering for the seed, but the leaf mould should be kept moist until the seed germinates.

Sow the seed in drills ¼ to ½in. deep and 18in. apart, and when the seedlings are well above the ground thin them out to 6 to 8in. apart in the rows. The ground between the plants must be kept weeded and well worked. August, September, and early October are the best months for the main-crop sowing and late February and early March for a crop for use in the spring.

Parsnips may be lifted and pitted in sand in a cellar, or in the open ground if it is necessary to dig the crop before it is required for use.

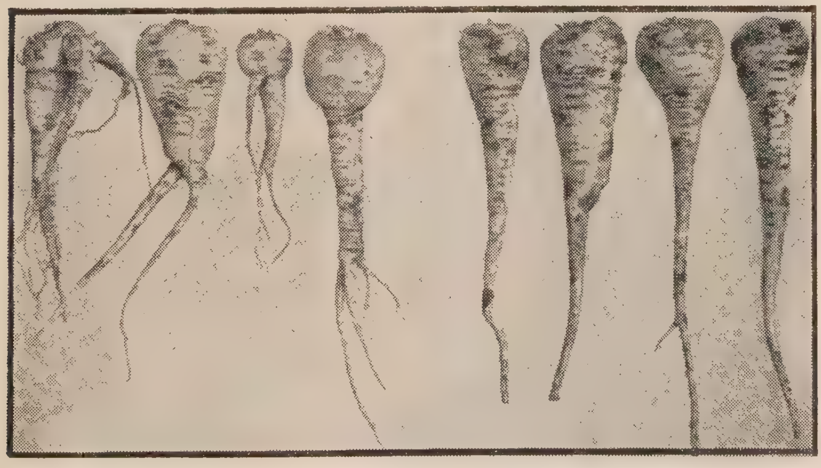
The most suitable variety for the home garden is Hollow Crown, but the turnip-rooted parsnip, which matures quickly and is of a good flavour, is worth a trial.

[*Sparrow Industrial Pictures Ltd. photo.*

The high yield per foot of tall-growing peas makes them profitable, especially where garden space is limited, and the height at which the crop is carried makes harvesting faster and less tedious. The harvesting period is much longer than that of dwarf varieties. Shelter from high winds is necessary and good soil conditions are advantageous. A wire-netting frame should be constructed to support the vines.

Turnips

If soil conditions are suitable, turnip seed may be sown almost the whole year round. Frequent sowings should be made, as roots that are a long time in the ground are apt to become stringy and develop a bitter, pungent taste. The ground must be in a good condition, and land that has been heavily manured for some preceding crop is suitable for turnips. Should manure be necessary, a mixture of equal parts of bonedust and superphosphate should be worked into the top 4in. of soil at least a week before seed is sown. Be careful not to over-manure, as this causes the plant to run to leaf at the expense of the bulb. Seed should be sown thinly in shallow drills and lightly covered with about ½in. of fine soil. Allow 12 to 15in. between rows and when plants are well above the ground thin them out to 3 or 4in. apart; thinning must be done early. While the crop is growing keep the soil between the rows loose with the hoe and destroy weeds as they appear. No further manure will be necessary provided the soil has been properly prepared in the first place.



[*Sparrow Industrial Pictures Ltd. photo.*

If manure is applied when parsnips are sown, it should be placed deep down and distributed evenly; if manure is put on the topsoil, parsnips like the four at left are likely to result. At right are four normal roots.

Good varieties are White Stone, Snowball, and Orange Jelly (Golden Ball).

Beetroot

Seed of the round or turnip-shaped red beets may be sown from August until March and of the long varieties from August to January. The round variety is generally more convenient for the home gardener than the long variety and where the soil is shallow the former only should be sown; it matures more quickly and the roots are ready to harvest in about 3 months from sowing under average conditions.

Sow the seed thinly in rows 15in. apart for the long variety and 12in. apart for the round sorts. Thin out the long varieties to 4in. and the round

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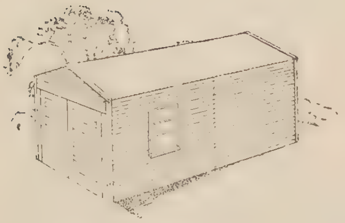

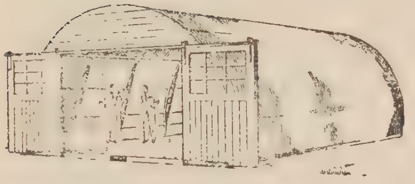

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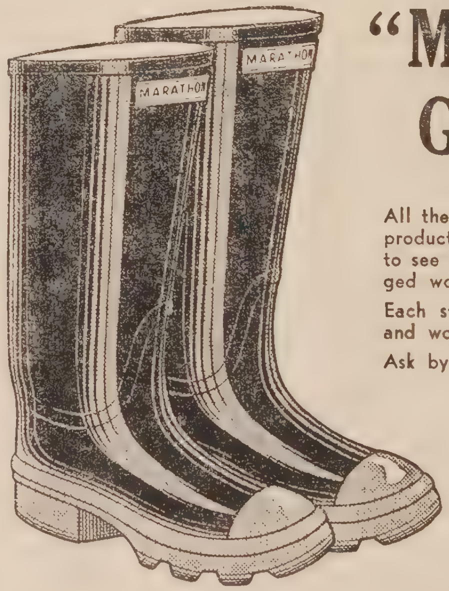

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THE HOME GARDEN IN AUGUST

sorts to 3in. apart in the rows. When thinning out be careful to "single" the plants, as generally two or more grow from the same seed vessel.

Provided beetroot follows a crop that was liberally manured, no artificial fertiliser is required.

When cultivating, care should be taken not to cut or injure the sides of the roots, and this same precaution must be taken when lifting them out of the ground, as a wound or broken root allows the sap to escape and the colour of the beet is lost.

Recommended varieties are: Round or turnip-rooted types, Derwent Globe, Early Wonder, and Egyptian Turnip Rooted; long varieties, Obelisk.

Silver Beet or Swiss Chard

Silver beet, which is quite distinct from red beet, is grown solely for the leaves and stalks and does not form a root that is edible. Silver beet is easier to grow than spinach and the young leaves stripped from the stalks make a good substitute for spinach. The white stalks may be cooked separately and served with white sauce or the whole leaf may be used.

Silver beet requires a rich, well-manured soil and a fine, thoroughly prepared seed-bed. Seed can be sown during August, but in cold localities sowing is better delayed until September; it is not necessary to plant a succession, as plants will continue to bear until they are cut down by frost or have run to seed in the following spring. Sow the seed in rows 24 to 30in. apart, allowing about ¼in. between the seeds and covering them with about ¼in. of soil. Thin plants to 15in. apart in the rows when they are 4 to 6in. high. Thinnings can be transplanted or can be cooked as greens.

Silver beet should be ready for the first cutting in 2 months from seed sowing. For home use it should be harvested by breaking or cutting off the outer stalks about 1 or 2in. above ground, care being taken to avoid injuring the crown or central bud. New stalks are produced from the centre of the plant, and repeated cuttings may be made. When the stalks are mature they should be removed, whether wanted or not, to promote continuous growth.

Good varieties are Lucullus, Fordhook Giant, and Dark Green Broad Ribbed.

Spinach

Spinach is a quick-maturing vegetable and among the first of the new season's crops to mature. It does well in early spring provided the soil has been previously well manured and limed. A fertiliser composed of 3 parts of superphosphate and 1 part of sulphate of ammonia by weight and applied at the rate of 2 or 3oz. a square yard will provide the stimulus necessary to produce crisp, succulent growth so desirable in this vegetable. Seed should be sown ½ to 1in. deep in rows 1ft. apart and plants should be thinned later to 3in. apart. For summer and autumn use, the round-seeded variety is best.

New Zealand Spinach, Mustard Spinach

New Zealand spinach is not a true spinach, but is quite a good substitute and thrives only during hot weather, which makes it suitable for growing under conditions in which true spinach tends to bolt to seed.

Mustard spinach is related to the mustard family, but the pungent taste of the mustard has been greatly refined. It has a most delicious flavour peculiarly its own and combines in itself the qualities of both spinach and mustard.

[*Sparrow Industrial Pictures Ltd. photo.*

Novelty vegetables: Ornamental gourds (of the order *Cucurbita pepo*) are very prolific and have varying skin colours and markings ranging from dark green to bright yellow. The fruit has a hard, wax-like rind. It is not edible and is used solely for decorative purposes. The fruits illustrated, with the exception of the three round fruits on right side of dish, which are orange marrows, are from one plant. Orange marrows besides being useful vegetables are interesting novelties. If displayed in a fruit bowl, they look like oranges.

Shallots

August is the best month for setting shallots. The shallot is a member of the genus *Allium*, closely allied to the onion, but quite distinct from it. Its bulbs are used in seasoning, the flavour being milder than that of the onion, and sometimes the green leaves are cut and used in salads. The shallot requires a fairly rich soil, but should not be planted on freshly manured land. If there is no soil in the correct condition, a plot should be manured well some weeks before planting. For planting break the bulbs into small cloves, draw drills 1in. deep and 24in. apart, and place the cloves from 6 to 8in. apart in the drills; press them into the ground and cover them lightly with soil. Frequent and thorough cultivation is all that is necessary for their success. If desired, the bulbs can be blanched by covering them with 2in. of soil about 4 weeks before harvesting.

Salsify or Oyster Plant

Salsify or vegetable oyster plant, with its long, narrow, fleshy root resembles a very narrow parsnip. The roots grow about 15 to 18in. long and are about 1½in. in diameter. Properly cooked they are a most delicious vegetable, having the flavour of stewed oysters.

To get the best results from salsify the soil should be prepared as recommended for parsnips; good-quality roots depend to a large extent on the preparation of the soil. As the roots are more liable to fork than parsnips or carrots, ground that has been well manured for a previous crop is preferable to that which has to be manured just before being cropped.

Sow seed in August or September in drills ½in. deep and 12 to 15in. apart, and when the seedlings are about 3in. high, thin them out to 6in. between the plants. The roots will be ready for lifting in February, when they may be harvested as required or lifted and stored in sand in a cool place to prevent the roots from shrivelling. The leaves of salsify, when properly blanched, make a delicious salad, and if some plants are required for this purpose, roots should be placed in an upright position in a box of sand and stored away from the light in a shed and the leaves gathered as they develop.

Herbs

Herbs such as parsley, mint, sage, and thyme should have a place in every home garden. They are best planted where they are easily accessible to the housewife, and a good effect is achieved if they are planted as a border at one end of the garden or adjacent to a pathway.

Parsley

Parsley is hardy and quite easily grown. Once established it does well and if not cut too heavily will continue to yield steadily until it flowers, after which its value is lost.

For summer and autumn supply seed should be sown now. Draw out shallow drills and sow the seed in rows 12in. apart, covering it with not more than ½in. of soil. Parsley seed is slow in germinating, taking from 4 to 5 weeks to come up. When the plants are well above ground, thin them out to 12in. apart in the rows. Do not permit the plants to crowd at any time. Pick parsley as required, but never strip the plants right down. To prolong the yield cut off seed stalks

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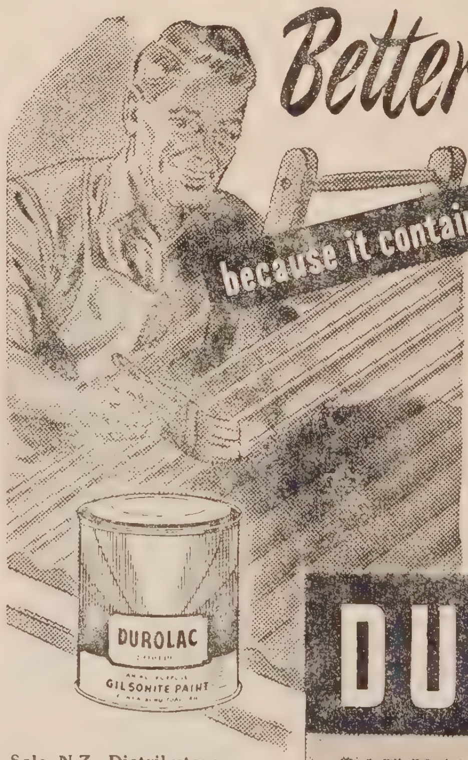

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as they appear. Parsley must be kept well watered during dry weather.

Varieties: The best are Triple Curled and Moss Curled.

Mint

Mint is best propagated by root cuttings of the creeping stems, and as it is a moisture-loving plant, cuttings should be set in a moist part of the garden; near a water tap is ideal. As it is inclined to wander if left to its own resources, it should be trimmed back regularly with a spade and the unwanted roots carefully forked out before they become too firmly established.

Sage and Thyme

Sage and thyme may be grown from seed sown in October, but generally they are propagated by a division of the roots of older plants, which are usually dug up and divided every 3 years, as by that time they have lost their vitality. Sage plants should be 18in. apart and thyme 1ft. apart.

Rhubarb

The health-giving value of rhubarb is considerable. It is a perennial, and provided it is well looked after and the roots are divided and replanted every fourth year, crowns will continue to yield first-quality stalks for 20 years or more.

The roots may be planted from June to August. After the roots have been producing for 3 years the crowns develop a large number of small buds and produce small spindly stalks. They should be dug up and, using a sharp spade, divided. Portions of the root containing one bold bud should be replanted in new ground that has been previously heavily manured with some humus-forming material such as farmyard or stable manure; if this is not available, a handful of blood and bone should be mixed into the soil around each plant.

The site for a new bed should be deeply dug or trenched, and all perennial weeds should be removed, and the soil well dressed with organic manure. Plants should be set 3 to 4ft. apart each way and the crowns covered with 2 or 3in. of soil. No stalks should be pulled from newly planted crowns the first year and only light pullings should be made the second season. If the plants are kept well manured, summer varieties can be pulled for about 3 months in spring; winter or ever-bearing rhubarb is usually pulled in autumn and winter. Pulling of stalks exhausts the crowns, and for best results they must have an adequate rest period each year.

Good varieties are Victoria Giant, Champion Seedless, and Topps Winter; the last will produce stalks all the year round, but is especially adapted to winter use, when the other varieties are dormant.

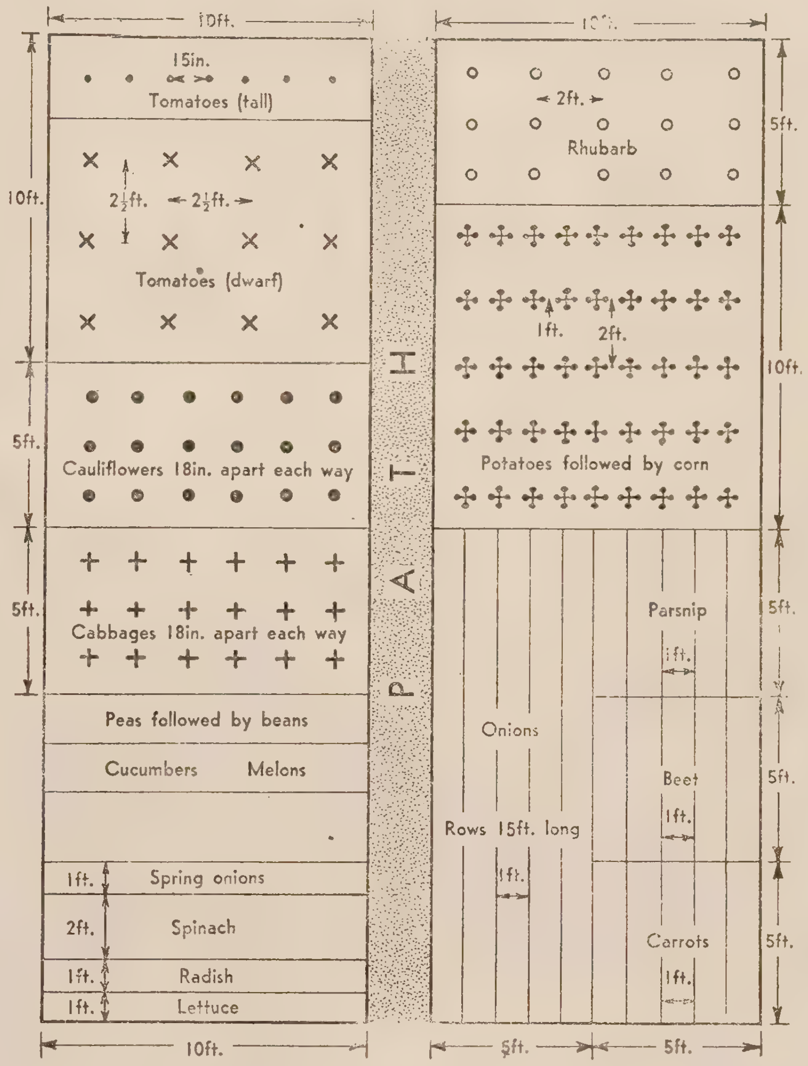
Cabbage and Cauliflower

For summer supply cauliflower of the early-maturing varieties, such as Early London and Phenomenal Early, and cabbage of the varieties Flower of Spring, Enfield Market, Golden Acre, and Green Acre (maturing in that order) can be planted now.

Good, rich soil is essential for success, and in the absence of farmyard manure or compost a mixture of 3 parts of blood and bone, 1 part of superphosphate, and 1/20 part of sul-

THE HOME GARDEN IN AUGUST

SUGGESTED PLAN FOR 20ft. x 30ft. PLOT



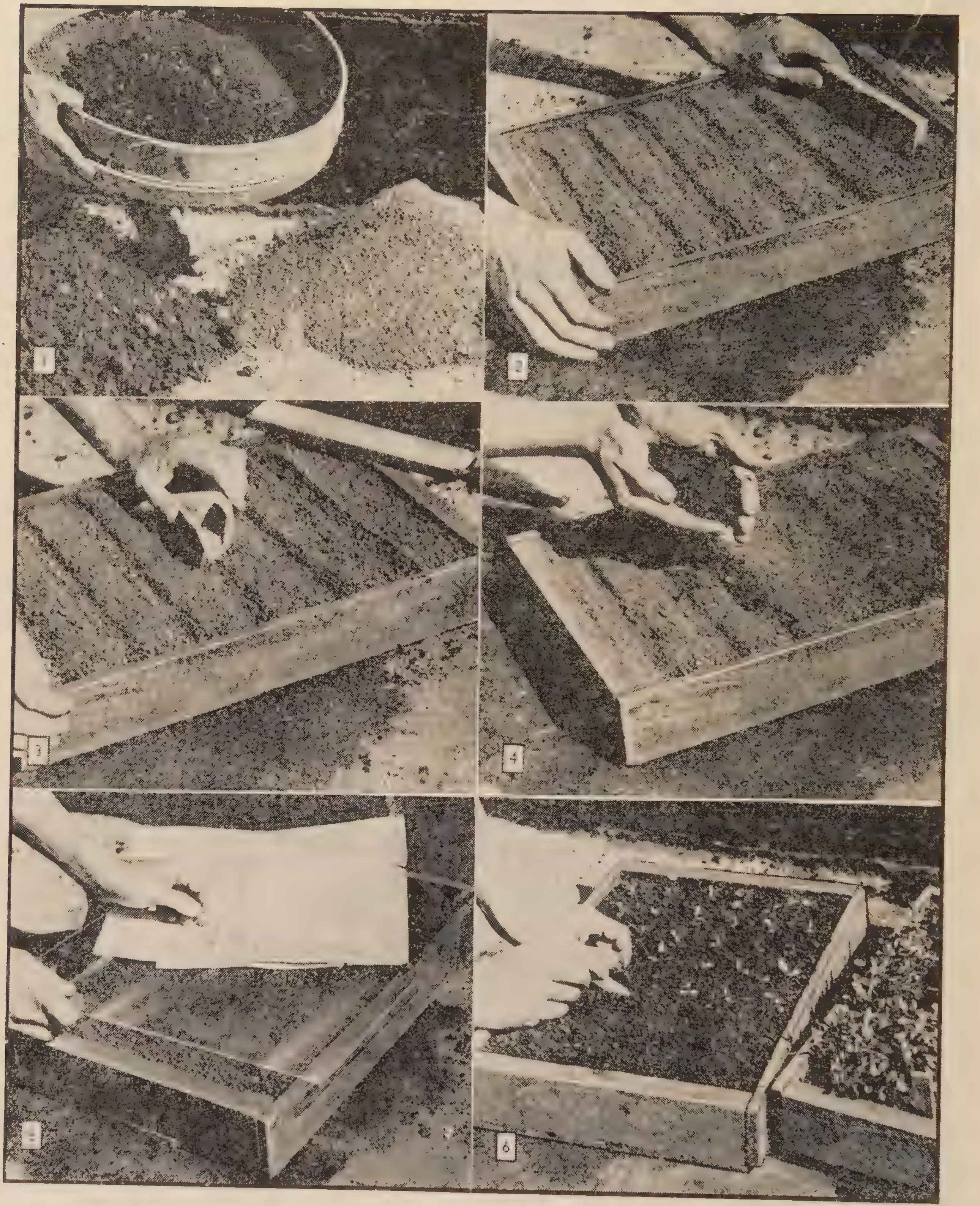
During early spring the home gardener should have decided upon or adopted a plan for the coming season's operations, as without this plan the work performed will be more or less indiscriminate. Plan to grow the early vegetables in the warmest situation. Do not plant tall-growing varieties where they will overshadow other vegetables. Have perennials, for example, asparagus and rhubarb, at one end and not in the middle of the garden. Keep vegetable rows straight and plantings compact.

SCHEDULE FOR ROTATION OF CROPS

As plants deplete or build up the soil in different ways, plan if possible a 3-year rotation system thus:—

	Garden Area A	Garden Area B	Garden Area C
1950 ..	Brassicas (cabbage, cauliflower, brussels sprouts)	Roots (carrot, parsnip, beetroot)	Peas, beans, potatoes
1951 ..	Peas, etc.	Brassicas	Roots
1952 ..	Roots	Peas, etc.	Brassicas

RAISING SEEDLINGS IN THE HOME GARDEN



[Sparrow Industrial Pictures Ltd. photos.

1—Sieving seed-box soil; the coarse material (left) caught in the sieve should be placed in the bottom of the box to a depth of 1in. and the box almost filled with the sieved soil (right). 2—After the soil in the box has been pressed down with a piece of board the seed rows should be marked out. 3—Sowing the seed. 4—Covering the seed. 5—A piece of glass should be placed over the box to hasten germination and to hold moisture. A sheet of paper can be placed on the glass to reduce the intensity of sunlight, but it must be removed as soon as the seedlings appear. 6—Pricking out the seedlings.

phate of potash, all by weight, incorporated in the plant rows at the rate of ½lb. to 4ft. of row, should suffice. Artificial manures should be spread evenly along the plant rows and worked in or covered with sufficient soil so that the plant root does not come into contact with a too-heavy concentration, which is liable to cause a check to its growth.

Plants should be spaced 15in. apart in the rows, which should be 30in. apart. At this time of the year it is not necessary unless the ground is of a heavy nature to plant on a ridge. If the plants are set out on the flat, they should have the soil moulded up to them as they grow, care being taken not to cover any portion of the leaves or leaf stems.

Preparation of Soil

Provided that the seasonal gardening programme has been adhered to, there should now be several areas that were dug over earlier and sown in cover crops or left rough for exposure to the weather.

Building up Humus Content

If farmyard manure or compost is not available, blue lupins are perhaps the best means of building up humus content. As they are a legume, they also increase the nitrogen supply provided they have been left long enough for the nodules to develop on the roots. These nodules are caused by nitrogen-fixing bacteria which live in partnership (symbiosis) with leguminous plants; each nodule is the home of millions of bacteria, which enter the roots from the soil. The plant supplies carbohydrates and in return the bacteria supply nitrogen in the form of compounds which the plants can use. As heavy green crops take a fairly long time to decompose, they should be incorporated in the soil several weeks before the ground is required for planting.

Plants usually suffer from nitrogen starvation if they are planted in land where thorough decomposition of organic material has not taken place, as the bacteria which break the material down use up the readily available forms of nitrates, depriving the plants of them. Temporary acidity may also develop, especially during the early stages of decay, which may retard the growth of plants or result in failure of seed to germinate.

Lime and Fertilisers

Lime is best applied to the surface of the soil and allowed to be washed in by rains. If it has not already been applied, a dressing should be given now. Carbonate of lime generally is used and an application of ½lb. to the square yard will greatly benefit most soils.

With a few exceptions artificial fertilisers should consist of a complete plant food, principally nitrogen, phosphoric acid, and potash. These three are necessary for most soils and usually they should supply all plant requirements. The quantities to be used depend on soil conditions and what kind of vegetable it is intended to grow. For instance, cabbage and lettuce being leafy plants require more nitrogen than root crops such as carrots or beetroot, which require a larger percentage of phosphates. Vegetables require only small quantities of potash, and although it should not be used to excess, it should not be omitted.

Breaking up Ground

Where the ground has been left rough over winter the top spit can be forked over and well broken down. This forking allows the air to penetrate the soil particles and encourages the escape of excess soil moisture, resulting in a better tilth and providing a good opportunity for the working in of artificial fertilisers or well-made compost; stable or farmyard manures are best dug into the ground some time before it is to be planted so that they are well rotted when cropping begins.

Light soils require only a shallow forking, as they break down well and readily crumble to a fine tilth if the soil condition is favourable. Heavy soils should be cultivated when they are only slightly moist and the sods can be broken down with the back of the fork. The gardener should work backward so that he does not consolidate the loosened soil.

Firming and Raking

The ideal seed-bed is one on which only shallow impressions are made when it is walked on. Soils that are of a heavy nature are liable to pack if care is not taken in firming; raking the soil is generally sufficient, but lighter soils can easily be firmed by walking over them with a shuffling motion. It is important to remember that the object of firming is to consolidate the soil particles sufficiently to increase capillary action, thus forming better soil conditions for seed germination.

The final work in the preparation of the seed-bed is done with the ordinary garden rake, the teeth of which should not penetrate the soil to a depth greater than that at which seed is to be sown. When soil preparation is complete all rubbish, loose stones, and lumps of soil should have been removed and the bed should be level and have a fine tilth. Care should be taken with heavy soils to see that they are not sticky, as if they are in this condition, it is impossible to obtain the desired results.

Soil Improvers

Heavy soils that are inclined to be of a sticky nature and therefore more difficult to work can be improved by the addition of a fairly liberal dressing of sand. This should be spread over the area and mixed with the surface soil to a depth of about 3in. Light, open-textured soils in which the soil particles require binding will benefit by an application of a humus-building material such as compost or stable or farmyard manure.

Raising Seedlings

Although the average home gardener prefers to purchase his seedlings, he can find much interest in propagating them. It involves only a small outlay and a minimum of time if simple methods are used. Several methods, however, will have to be adopted, depending on the time of year, climatic conditions, and the kind of vegetable it is desired to grow.

When climatic conditions are favourable and the soil is fairly warm the outdoor seedling bed is satisfactory. This should be made in a sheltered position and should comprise good, well-drained, light, loamy soil. The soil in the seed-bed must be thoroughly and deeply worked and the surface brought to a fine tilth. If the ground is of a clayey nature, the addition of sand, wood ashes, or decayed vegetable matter will considerably improve it.

When the soil has been thoroughly prepared level the surface with a rake and gently pat it with the back of a spade to make it firm, after which it is ready to receive the seed. The seed should be broadcast thinly and evenly on the surface of the bed or sown not too thickly in shallow drills and covered lightly with fine soil. When the seed has been sown cover the surface soil with some finely broken-up, well-decayed manure. This mulch reduces evaporation, keeps the roots of the tiny plants cool, and promotes vigorous growth. While in the seed-bed seedlings should be kept supplied with moisture when necessary by watering them with a watering can fitted with a fine rose.

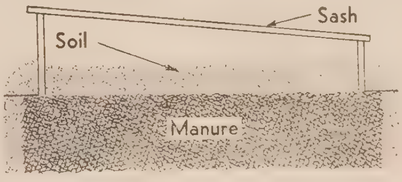
Cold Frame

Every home gardener should possess a cold frame, which is very useful not only for hardening plants started in a hotbed, but, in mild climates, for raising early seedlings. The most convenient size is a box-like structure 4ft. 6in. wide by 9ft. long (18in. high at back and 12in. at front) with 3 neatly fitting, sliding sashes on top supported by 4 rafters placed across the frame from back to front. To avoid any danger of sashes being lifted off by strong winds it is a good practice to place wooden buttons in the middle of each rafter, allowing the sash to be drawn freely backward or forward for ventilation.

The cold frame should be placed in a sheltered position at the best angle to secure maximum sunshine. Fill the interior to a depth of 3in. with good potting soil and pile a little earth against the outside of the frame to keep out draughts. If the frame is required for hardening off or for raising plants in seed boxes only, the floor of the frame may be covered with small cinders or fine scoria. In localities where frosts occur plants in cold frames must be protected by covering the glass at night with straw or sacks.

Hotbed

A temporary hotbed, which is very handy in colder localities for raising early seedlings, can be made of strawy stable manure, brewers' hops and straw, or a mixture of green vegetable matter and straw. Select a perfectly dry position sheltered from southerly and westerly winds and well drained, for if water is permitted to lie around the base of the bed, a good even temperature cannot be kept. Dig a pit 12 to 18in. deep on the site intended for the bed and slightly larger than the frame that is to be placed upon it. Keep the sides of the pit



Showing how a hotbed should be made.

perpendicular. When the pit is completed shake out the manure and place it evenly in the pit; it should be thoroughly compacted by tramping as the filling of the pit progresses. The manure for hotbed purposes should contain sufficient litter, such as leaves or straw, to prevent it packing and should spring slightly when trodden on.

After the manure has been properly tramped and levelled the frames to support the sashes are placed in position, facing north. These frames are similar in construction to cold-frames and have one or more sashes according to the size required. When the frame is in position, 3 to 5in. of good garden loam or specially prepared soil is spread evenly over the area enclosed in the frame, the sash put on, and the bed allowed to heat. To keep warmth from escaping and rain-water out soil is thrown up around the outside edge of the frame.

At first a strong heat will arise, but when this has abated to a temperature of 85 to 90 degrees F. (usually in about 3 days) seed may be sown in boxes placed in the hotbed or in earthenware pots; it is best to bed the pots partly in the soil. During bright days the hotbed will heat very quickly from the sunshine on the glass and it will be necessary to ventilate it during the morning by slightly raising the sash on the leeward side. Care should be taken in ventilating the bed to protect the plants from a draught of cold air. Toward evening the sash should be closed to warm the bed sufficiently before nightfall. Hotbeds should be watered on bright days and in the morning only. Watering in the evening or on cloudy days will tend to chill the bed and increase the danger from freezing. After watering, the bed should be well ventilated to dry the foliage of the plants and the surface of the soil to prevent the plants being lost by damping-off fungi or mildew. It is also desirable to have a supply of straw on hand to throw over the frame in case of extremely cold weather.

Seed Boxes or Trays

The most practical method of raising early vegetable plants for the home garden is by using seed boxes. The following dimensions will give a handy-sized seed box: Depth, 3½ or 4in.; width, 12 to 14in.; length, 20 to 24in. Drill several evenly spaced ½in. holes in the bottom of the box to provide drainage.

Good soil for filling the boxes consists of 1 part of well-rotted manure, 2 parts of good garden loam or rotted turf, and 1 part of sharp, fine sand. The manure should be thoroughly rotted, but it should not have been exposed to the weather, as the strength will have been leached out of it. Mix all the ingredients in a heap, stirring them well with a shovel, and sift the soil.

The coarse material caught in the sieve should be placed 1in. thick in the bottom of the seed box and the box then almost filled with the good soil. Press the soil down with a piece of board and mark out rows crosswise ¼ to ½in. deep and 2in. apart. Sow about 8 to 10 seeds to each inch of row and cover them with soil. Water the soil and place the box in a cold frame or if this is not available, in a warm situation such as just inside a sunny window. Water the soil sufficiently to cause germination and growth, but do not give so much water that it leaks through the box. A piece of glass used as a cover will hold the moisture and hasten germination. A sheet of paper can also be placed on top of the glass, but it must be removed as soon as the seedlings appear. When moisture is seen to accumulate on the underside of the glass surface the glass should be turned, as soil which is too moist provides a congenial environment for the development of fungi.

Sterilising Soil

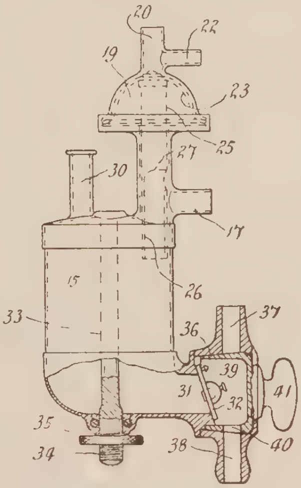
As a safeguard against soil-borne fungi such as those producing "damping-off" and foot rot the soil for seedlings should be sterilised. For the home garden, where only a small quantity of soil has to be treated, the best method of sterilising soil is as follows: After filling the seed boxes with soil water them with a formalin solution composed of 1 part of 40 per cent. commercial formaldehyde to 49 parts of water at the rate of 5 pints to each cubic foot of soil. Then stack the seed boxes one on top of the other in a heap and cover them with wet sacks for 48 hours. All traces of the fumes should have disappeared before the soil is used. Dispersal of the fumes can be facilitated by breaking down the stack and stirring the soil in the trays.

◆

Recent Patent Specifications for Farming Inventions

The following particulars of recent patent applications of interest to farmers have been selected from the Patent Office Journal issued on May 2, 1950, and are published by permission of the Commissioner of Patents, Wellington. Photostat copies of any specifications will be supplied for a small fee on application to the Patent Office.

No.	Description.	Applicant.
97265	Releaser and Vacuum-break Combination for Milking Machine,	James Enoch Haywood.



[Only those references which are necessary to an understanding of the specification are quoted in the abridgment below.]

A combination of a releaser and vacuum break device which permits optional collection of each cow's milk in bucket or withdrawal through the common milk pipe, and which is installed in each milking bail, consists of a double-ended pump (not shown) connected with one end to a releaser chamber 15 through nipple 30, while the other end is connected through nipple 20 to a dome-shaped vacuum-break mechanism 19, within which a flexible diaphragm 23 is secured to a plunger rod 25, lifting and lowering the latter in synchronism with the varying pneumatic pressure, thereby in turn either making or breaking connection—through its tubular bore 26 and port-hole 27—with the milk branch 17. The lower end of the releaser chamber 15 may be connected to the vacuum main, whereby a hollow plug 39 permits the withdrawal of milk either into a bucket through outlet 38 or into the milk main through nipple 37.

92126	Nozzles for Spray-dipping Sheep,	Cooper Engineering Co., Pty., Ltd.
94144	Garden Tractor Construction,	Alister Black.
94593	Cream Treatment for Continuous Buttermaking Process,	The Creamery Package Manufacturing Co.
96183	Reservoir for Drenching Appliance,	William Peirson.
97502	Unloading Means for Lime or Fertiliser,	Hereward Joseph Betheridge Topp.
97751	Cheese Turner,	William Henry Davidson.
97869	Drench-gun for Pellets,	Imperial Chemical Industries of Australia and New Zealand Ltd.
98960	Staple for Concrete Fence Posts,	Charles Ernest Dunn.
99623	Lawnmower,	Robert Henry George Cave.
99646	Drench-gun for Liquids,	Allan Freeman Mitchell.
99994	Bulk Distributor for Fertiliser,	Alick Will Hay and Walter Alan Park.
100007	Milking-machine System (using Movable Overhead Carrier),	Aktiebolaget Manus.
101173	Unloading Device for Logs off Lorry,	George Whitnall Snow and Lemuel Francis Davies.

SMALL CONCRETE FEEDING TROUGHS

MANY farmers today are realising the advantages of being able to construct on the farm at reasonable cost small but necessary items for farm use. Details of methods used for the construction of small feeding troughs on the Mahora Stud Farm, Hastings, are given in this article by F. H. Collin, Fields Instructor, Department of Agriculture, Hastings. The troughs, which have been produced and used on the farm for a number of years, have proved completely satisfactory for feeding swill to pigs and wet mash to poultry. Larger troughs used as watering troughs for stock have also been made, simply by extending the moulds described.

ALL details of measurements for the construction of the moulds are shown on the diagrams. Troughs are reinforced with ⅜in. steel rods, 4 lengths of reinforcing 3ft. 8in. long and 2 lengths 14in. long being required for each trough. Both ends of the outside mould (Fig. 1) are detachable. The ends are clamped on with iron pins (Fig. 2) before the inside mould (Fig. 3) is fixed in place.

Before the concrete is mixed all the parts of the mould which come in contact with the concrete are thoroughly oiled with old engine oil. The sheet iron covering the outside portion of the mould is also oiled.

The concrete mixture used is 3 to 1 and preferably should consist of 7 parts of ¼in. chips, 5 parts of sand, and 4 parts of cement.

A 2½in. layer of concrete is laid in the outside mould and two 3ft. 8in. steel rods are worked into position in the wet concrete, care being taken to see that they are kept at least 1in. from the bottom of the mould. The inside mould is placed on top of the concrete in the outside mould and worked into position, care being taken to see that the space between the moulds is the same at each end.

The bolts as shown in the illustration of the mould clamped into position (Fig. 4) are fitted into the holes provided for in the ends of the outer mould. These bolts hold the inside mould firm and prevent it from lifting when the concrete is rammed into the sides.

A piece of oiled cardboard is then fitted on each end of the inside mould (Fig. 5) and a small amount of concrete used to hold it in position. The outside mould is then filled evenly with concrete, and while this is being done it is essential to tap the sides well and ram the mix with a trowel.

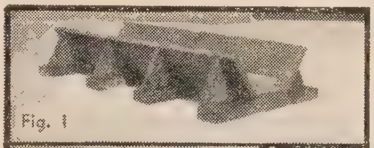


Fig. 1

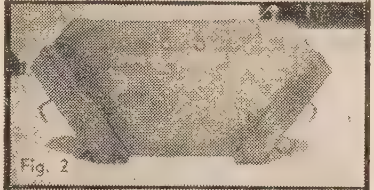


Fig. 2

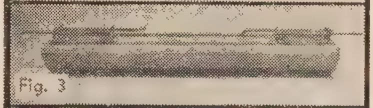


Fig. 3

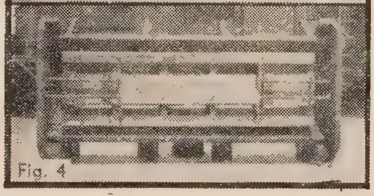


Fig. 4

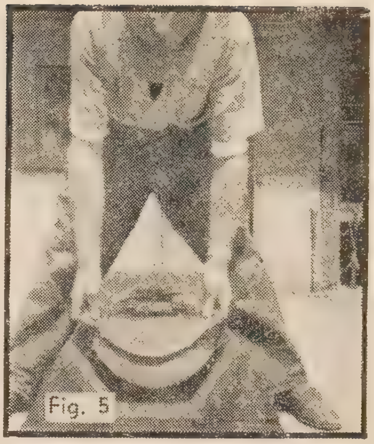


Fig. 5

The two short pieces of reinforcing are then put in the concrete, one at each end of the mould, and the remaining two long rods on either side.

Next the concrete is smoothed off with a trowel and left for 12 hours or a little longer. The bolts holding the inside mould in position are removed and the complete mould lifted from the trough.

The cardboard inserted at each end of the inside mould is essential, because without it there is grave danger of the concrete cracking when the mould is lifted.

The trough is left for 3 to 4 days in the outside mould before the ends (Fig. 2) are removed. The finished trough (Fig. 6), which has a capacity of 4 gallons, can be used in 14 days.

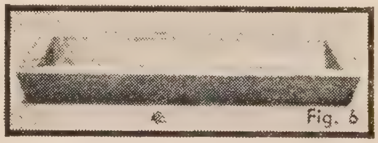
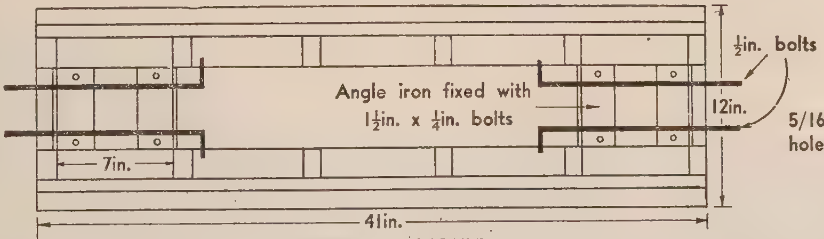
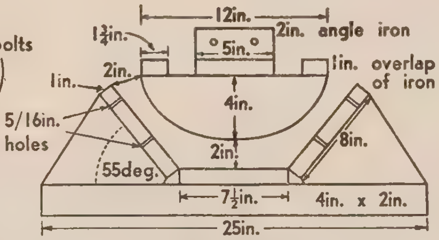


Fig. 6

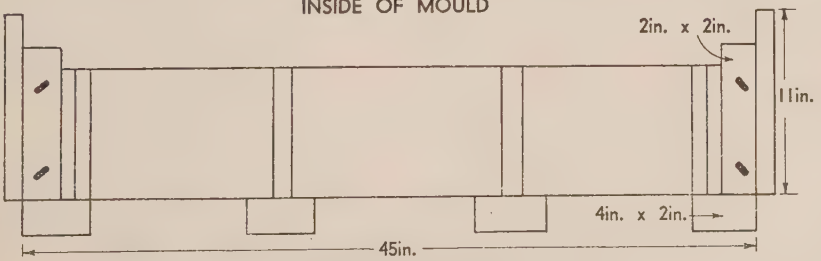
The initial outlay for timber, sheet iron, bolts, etc., for the moulds is small and the trough can be made very cheaply and quickly.



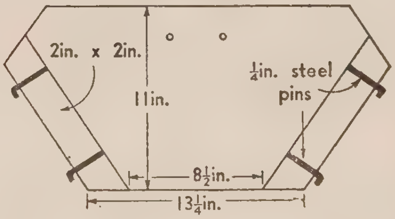
INSIDE OF MOULD



END VIEWS



OUTSIDE OF MOULD



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Destroying a Diseased Hive

Seasonal Notes for the Domestic Beekeeper

AS American foul-brood is a most infectious disease of bees, a domestic beekeeper may find it necessary at any time to destroy a diseased hive. The precautions which should be observed in this operation are dealt with by J. E. Rodie, Assistant Apiary Instructor, Department of Agriculture, Palmerston North, in this month's article for the domestic beekeeper.

THE safest and most effective method to deal with a hive infected with American foul-brood (*Bacillus larvae*) is to burn the bees, frames, and all honey, then later to scorch thoroughly supers, floor boards, and all other hive parts. The responsibility to do away with a diseased hive rests entirely on the owner. If the bees are situated within a city or borough area, however, it is necessary to procure from the local fire brigade a permit to light a fire out in the open. Within populous areas it is advisable to wait if possible for a suitable day on which there is no strong wind blowing so that a fire hazard is not created.

Destruction of Bees

The most common way of destroying bees is to gas them with calcium cyanide. This gas is a deadly poison to human beings as well as to bees, and in a confined space will cause death almost instantly. The powder should not be allowed to come in contact with the fingers or the body. The best time to destroy a colony of bees is in the evening when no bees are flying. Place a tablespoon of calcium cyanide on a piece of damp cardboard and slide the cardboard into the hive entrance, taking care to stand on the windward side. In a very short time the bees will all be dead.

Another effective method is to pour a bottle of petrol into the hive, close down the lid, and leave it until the vaporised petrol has killed the bees. Care should be exercised when the material to be burnt is ignited, as the fumes will create a small explosion. After the bees have been killed the hive contents should be destroyed immediately; otherwise bees from neighbouring hives may enter the hive and spread the disease. A colony should never be burnt on the surface of the ground, as the infected melted honey may run into the grass and roots and be taken up by robber bees.

Gassing of bees with calcium cyanide. The powder is spread on damp cardboard and pushed into the hive entrance.

Burning Hives

The first step in burning hives is to dig a hole measuring roughly 3ft. x 3ft. x 9in. to 1ft. 6in. deep close to the hive affected and well away from shrubs or trees so that they will not be scorched.

As the land where the burning is carried out may later be ploughed, care should be taken that there is no possibility of the burnt honey being ploughed up on top of the ground; if this happens, a recurrence of disease would be possible. Part of the hole should be deep enough to take any liquid honey that may escape the fire This honey should be burnt well below ploughing level.

Two iron bars or old pipes placed across the top of the hole are helpful in keeping the fire from collapsing. If there is much honey to burn, this method will keep the centre of the fire open, allowing the honey to melt and run away without choking the fire. The transferring of the frames and bees to the excavation should then be done. Care is necessary to avoid spilling any dead bees on the ground, because when the bees are gassed they disgorge honey from their honey sacs and this honey is a source of infection if other bees lick it up.

Paper or dry twigs should be placed in the hole to give the fire a good start. After prising off the top super of the infected hive with a hive tool slowly turn the super upside down in the hive cover, where it can be carried without spilling dead bees, the super of combs should be placed on the loose soil in the reverse position, with the cover uppermost. Carry out the same procedure with the remaining supers, using the cover to hold each super. Take out the combs separately and stack them up in the hole, making sure to put the dry combs in the centre as they will burn easily. Pour on a little kerosene or petrol and drop in a lighted match. When the fire has a good hold add additional combs containing any honey and the dead bees. Care should be taken not disturb the fire to any extent, as liquid honey may extinguish it.

Supers placed on iron bars above a fire for final scorching.

Scorching Supers

After the frames and combs have been reduced to ashes prise the metal rabbets off the supers, which have to be scorched. Place the first super on the bars and quickly add the remainder on top. The draught immediately caused by the chimney effect of the supers will draw up the flames and in a minute or two the supers should be sufficiently scorched. Knock them off the bars quickly with a shovel to avoid charring them.

Another method is to take a super and place it on two bricks, dropping in an armful of hay and pouring on a little kerosene. The additional supers are added and the hay ignited. After the flames have roared up through the supers for a short period the hive cover is placed on the top to smother the fire. Another effective method is to use a blowlamp.

Before using the supers, hive lids and bottom boards again it is advisable to paint them both on the inside and outside. The remains of the fire should be covered up so that bees cannot get access to any honey that has run from the combs. If a hive tool has been used in the operation, it should be well sterilised by fire before being used again. The use of gloves is not recommended when burning American foul-brood, as they are difficult to clean and are liable to spread infection. Care should be taken to avoid getting honey on the hands or clothes when handling all diseased material.

American foul-brood is a highly infectious disease of bees, and if the precautions described are not observed, any attempt to eradicate the disease may be only a means of furthering it. It is a notifiable disease, and under the provisions of the Apiaries Act, 1927, beekeepers are required to notify the Department of Agriculture within 7 days of the discovery of any diseased bees. They should, however, deal with any hives containing foul-brood immediately the infection is discovered.

Benefits from Topdressing and Cobalt Application

DEVELOPMENT OF FORMER BUSH-SICK AREAS IN TAURANGA COUNTY

By A. V. ALLO, Instructor in Agriculture, Department of Agriculture, Tauranga.

THE casual visitor passing through the Bay of Plenty finds it hard to credit the phenomenal development that has taken place in the district over the past 20 years. The country appears to be so easy to farm that it is difficult to believe the history of hardship and disaster associated with many areas of the Tauranga County.

IN the early days of settlement pioneer farmers were greatly attracted by the easy rolling country with its mild equable climate and its ease of development, and it was not long before areas were being sown down to grass. However, it was soon found that this grass would last only a few years before starting to run out to weeds and rubbish, so that early farming in the district was characterised by short-lived pastures, which were usually followed by crops of swedes and, sometimes, on the better country, of maize, after which the land was returned to grass.

The introduction of phosphatic topdressing into the Bay of Plenty about 1914 saw a profound change in the methods of pasture management, as it was found that this kept pastures at a satisfactory level of production.

Unfortunately this was not the end of the worries of many farmers in the Tauranga County. While the farmers on land west of Tauranga, along the road to Katikati and Waihi, were able to run all classes of stock successfully, many of those on the rolling country east of Tauranga and round the Te Puke district found that they still had inexplicable difficulties in running stock. Properties could carry beef cattle satisfactorily and, indeed, fatten them on the better-developed and topdressed pastures, but they could not rear young stock. Many tried to run sheep, with disastrous results; breeding ewes did not thrive and it was almost impossible to keep lambs after Christmas. A number of properties set up as sheep farms bankrupted their owners and the land went back to fern and scrub.

Swing to Dairy Farming

With the opening of dairy factories at the turn of the century there was a marked swing from cattle production—previously the major agricultural activity of the district—to dairy farming, but even then there was great difficulty in raising young stock, most of which had to be brought in from other districts.

The problem was not to be solved for many years. Various treatments and remedies were tried, many of them falling into the "quack" category; the only one affording any measure of relief was ferri-ammonium citrate, which, however, was unpalatable to stock and difficult to administer. Then, in 1931, it was found that certain brands of limonite fed as licks gave satisfactory results, and it was at first considered that the trouble was due to an iron deficiency. This theory was exploded when it was found that certain brands of limonite were ineffective in remedying "cattle sickness" or "bush sickness" as it was called. The deficiency was not of iron, but of some element that was present in some brands of limonite and not in others.

At length, as a result of research in both New Zealand and Australia, the cause of bush sickness was found in 1935 to be a deficiency of cobalt, and the way was now open to revolutionise farming practices on the bush-sick areas. No longer were farmers confined to running beef cattle and mature dairy stock, which frequently had to be run off on the healthier swamp areas. By using cobalt either as a topdressing, as a drench, or in licks all classes of stock could be run without any trouble.

It is now, of course, realised that the cobalt deficiency on much of the North Island pumice country is associated with some of the pumice ash showers. In the Tauranga County the Kaharoa ash shower, which was cobalt deficient, covered those portions of the county east of Tauranga except the swamp areas while the country west of Tauranga was mostly covered by the Waihi and Whakatane ash showers, which were not deficient in cobalt.

In the early 1930's Tauranga farmers were faced with another problem—ragwort. It started to increase rapidly over most of the county, and though it was possible to control this weed on the smaller farms by spraying and dusting with sodium chlorate, it was found that heavily infested areas could be handled economically only with sheep.

Thus the discovery that cobalt was the cure for bush sickness came at a most opportune time, because it became virtually necessary to use sheep as a means of controlling ragwort.

Many hill-country properties had to change over from dairying to sheep on account of the ragwort menace, and others continued to run dairy stock on the cleaner country and sheep on the heavily ragwort-infested gullies and sidlings.

Sheep grazing on Pongakawa country.

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The following table shows the remarkable increase in sheep numbers in the Tauranga County over the past few years:—

Year	Breeding ewes	Total sheep
1925	5,919	18,109
1935	30,117	40,642
1940	66,934	90,992
1945	132,850	185,707

The change-over from wethers and dry ewes to breeding ewes is shown by the following figures:—

In 1925 the number of dry sheep was 168 per cent. of the breeding-ewe figure; in 1945 the number of dry sheep had dropped to only 15.2 per cent. of total breeding ewes.

An excellent picture of the land improvement history of Tauranga County is given in the following table:—

AGRICULTURAL STATISTICS FOR TAURANGA COUNTY

Year	Area occupied (acres)	Area improved (cultivated) (acres)	Area topdressed (acres)	Total cattle	Total dairy cows	*Total sheep
1901 ..	N.A.	55,963		14,596	3,034	5,655
1906 ..	N.A.	78,554		19,504	3,987	3,476
1911 ..	N.A.	99,211		27,926	8,246	7,324
1916 ..	209,693	117,366		32,341	8.637	12,852
1921 ..	263,355	132,505		43,884	15,094	11,433
1926 ..	276,607	130,908	†48,065	50,987	25,445	15,657
1931 ..	280,292	153,072	75,493	73,935	39,350	29,757
1936 ..	281,236	156,260	80,562	83,385	54,506	56,321
1941 ..	282,414	167,021	111,336	96,884	56,310	121,705
1946 ..	287,576	177,786	89,334	99,425	54,381	N.A.
1948 ..	290,520	184,017	113,637	101,790	55,694	215,154

* As at April 30. † 1927, first year of enumeration. N.A. Not available.

History of Farm in Bush-sick Area

The story of the development of the Tauranga County through topdressing and cobalt can, perhaps, best be illustrated by giving the history of a farm in the bush-sick area. A farm in the Te Puke district has been selected, and the general story of its vicissitudes is fairly typical of what has happened on numerous farms in the area. The farm is 635 acres and is situated in the Maniatutu district, 13½ miles from Te Puke. The property, which is on easy rolling country, is bisected by a deep gully into which run several minor gullies which provide excellent natural shelter. There are a few patches of undrained swamp in the valley bottoms, accounting for only a few acres.

The property, which was purchased in April, 1902, for £1 5s. an acre, was ring fenced and there was also a 3-wire fence subdividing the front 250 acres of the farm. This portion of the property had been burnt in 1901 and was supposedly sown down with grass seed. Judging from results, however, only half the area had received any grass seed, the balance showing nothing but young manuka. The remainder of the farm consisted of 150 acres of manuka up to 10ft. high and heavy fern and tutu country. The whole farm had been part of a 1200-acre property and contained no buildings. One of the first tasks was to build a house, which was constructed of kauri obtained from Mercury Bay.

At the time of purchase the farmer had three sons aged 12, 10, and 7, the last being the present occupier. They struck trouble right at the start when the back of the property was swept by fire, which started 6 miles away and burnt out an area of 50 square miles. Nothing could be done to develop this burnt-out area owing to the lack of finance, and it just had the effect of making later development all the more difficult.

The history of this farm is divided into several well-defined periods:—

1902-1910, clearing and surface sowing.

1910-1916, ploughing up.

1916-1930, improvement by topdressing.

1930-1939, the change-over to dairying.

1939-1949, change-over from dairying to sheep farming.

It is intended to describe briefly the farm operations characteristic of each phase.

Clearing and Surface Sowing

During the period 1902-1910 about 30 to 40 acres of the easier country were developed yearly. The fern was burnt in the late summer and the area sown with 12 to 15lb. of grass seed per acre. The seed mixture used consisted of:—

	lb.
Red clover	3
White clover	1½
Alsike	1
Cocksfoot	6
Timothy	½
Chewings fescue ..	1 to 1½

After the seed was sown the area was harrowed or lightly disced to cover the seed. It is interesting to note that the clover seed was treated with red lead to protect it from birds.

Undeveloped country in the Pongakawa district.

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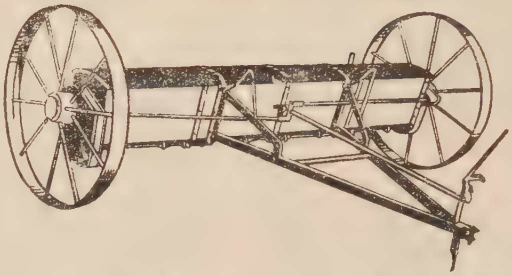

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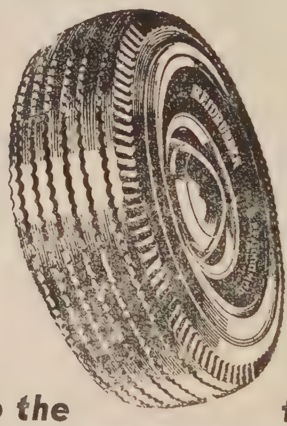

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When the easier fern country had been handled about 40 to 50 acres of manuka country were developed each year. Here the scrub was cut with slashers, burnt in the early autumn, and surface sown as already described. During this time all the work was done by the farmer and his family, using three horses. By the end of 1910 all the easier country had been sown to grass. These early pastures were marked by a phenomenal growth of clovers after the burn, but once this temporary fertility was exhausted pastures rapidly deteriorated to weeds and rubbish and threw very little feed.

In 1902, before the house was built, a small orchard covering ¾ acre was planted and a plantation of wattles was sown in 1903. In the following year the main belt of pines was planted from seed sown in 1903. The first stock run on the farm were bought in 1902 and comprised 60 head of 1- and 2-year-old cattle, nearly all Shorthorns. These had a lean winter in 1903, but survived without loss. They were wintered on the unimproved land, and, although they had access to a great deal of tutu, this plant did no harm. Indeed, in those early days some settlers claimed that tutu was the antidote to cattle sickness.

During this period the general policy was to buy young cattle in the autumn and sell them as forward stores to the fattening farmer during the following spring. No stock were reared on the property and in general stock were on the farm under 12 months. As the area in grass increased so did the number of stock carried, until, in 1912, 180 head were wintered, or a beast to every 3 acres of grass.

Ploughing Stage

The second period, from 1910 to 1916, could be termed the ploughing stage, during which the land grassed during the first stage came under the plough. By this time the tutu roots had rotted down and the regrowth of manuka and fern was still small enough to allow ploughing to be done. About 40 to 50 acres were tackled each year, of which about 10 acres were sown in maize and the balance in swedes. It was during this period that the farmer realised the advantages in providing good winter feed so that he could buy in cattle on the cheap autumn market and sell them at a handsome profit when prices rose in the following spring.

After the crop the land was summer fallowed and sown back to grass in the following autumn. By this time the pasture mixture varied from that used during the initial development, being increased to over 18lb. of seed per acre. The standard mixture used was:—

	lb.
Cocksfoot	6½
Italian ryegrass	3
Perennial ryegrass	3
Red clover	4
White clover	2/3

There were only a few small areas which were ploughed and sown directly back into grass. In those early days maize yields varied from 20 to 40 bushels per acre according to the quality of the land, but crops of 20 to 25 bushels were common. Even with these yields the crop provided a badly needed addition to the farm income.

During this period the steeper faces were surface sown to grass while adjacent easier country was being sown down.

With all the ploughing that was required the horse team was increased to 6, for which about 10 acres of oats were grown yearly after swedes to provide chaff.

During this period haymaking was started on a fairly large scale. In the initial stages of development first-year grass paddocks, consisting mainly of red clover, were sometimes cut, but only to a very limited extent. In the second period, however, up to 40 acres were cut yearly, increasing in 1916 to 60 acres.

The most important development, however, was the beginning of topdressing on a limited scale, up to 10 tons of superphosphate being bought each year. Most of this fertiliser went on the hay paddocks, so that yields of hay increased, with consequent increase in the winter stock-carrying capacity.

The pastures sown during this period produced reasonably well for a year or so on the built-up fertility after the grazing of the swedes and maize stalks, but, unless topdressed, they soon began to deteriorate to weeds and inferior grasses. In marked contrast topdressed pastures held out well and showed an outstanding response to the phosphatic dressings. During this period the property was subdivided into 9 paddocks.

It was not long before the farmer started sowing his swedes with manure, using a mixture of half superphosphate and half bonedust at the rate of 2cwt.

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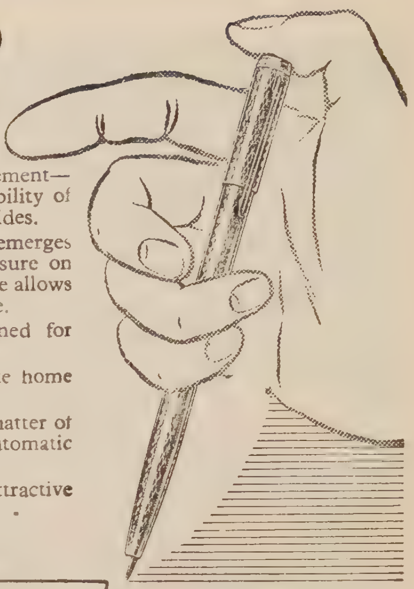

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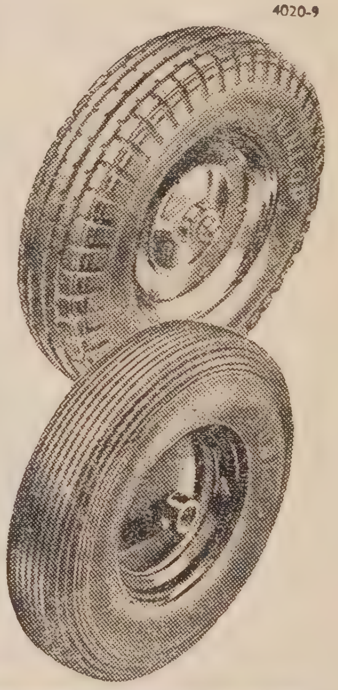

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per acre. Later the rate of application was increased to 3cwt. per acre. In 1913 the first new grass was sown with manure (1cwt. per acre each of guano and superphosphate) and the response was so marked that it became the standard practice to sow down all grass seed with manure.

From 1912, with the cutting of hay, the introduction of topdressing, and the growing of winter crops, the stock policy changed from selling stock as forward stores to fattening them on the farm, so that the farmer could cash in on the spring market.

Improvement by Topdressing

The third period extended from 1916 to 1930. The policy of ploughing up 30 to 40 acres of the poorest pasture for swedes each year was continued and there was a steady improvement in pasture production. In 1927 the first paspalum was sown on the farm. Before this there had been considerable local prejudice against this grass, mainly because very little was known about its correct management. When the farmer changed over to dairying during the depression he greatly regretted the lack of good paspalum on the property.

Because of increased stock prices during this period, there was a great reduction in the amount of maize grown, all efforts being concentrated on beef cattle production. The amount of fertiliser used increased from 12 to 15 tons in 1916 to 30 tons in 1928, nearly all being superphosphate.

By this time two sons had left the farm and the management was in the hands of the youngest son. In 1928 he expanded his scale of operations considerably, increasing his manuring and grass seeding, and buying large numbers of stock, so that when prices collapsed in 1929-30 he was all the more seriously hit.

The policy of cattle fattening was continued throughout this period. There was still no breeding done, mainly on account of cattle sickness, and also because it paid the farmer better to buy in rather than to breed his own stock. No sheep were run because of the cattle sickness. The peak stocking was in 1925, when 340 head of cattle were wintered, and 300 head were wintered in 1930.

> **This spectacular increase over the years was undoubtedly due to increased topdressing with consequent pasture improvement, better crops, and more hay.**

Change-over to Dairying

The period from 1931-1939, which included the slump and the subsequent recovery, was the dairying period during which there was a revolutionary change in farming operations. The collapse in stock prices forced the owner to change over to dairying, which again entailed a considerable capital outlay for dairy stock, erection of a cowshed and piggery, increased subdivision (from 9 to 20 paddocks), erection of a milker's cottage, etc.

All beef cattle were sold in 1930 and in 1931 outside cattle were taken in for grazing while the farmer prepared to change over to dairying. He also bought 162 weaner Jersey heifers. Whereas fattened cattle had been healthy, these heifers started to go back in condition after 6 months, in spite of being on good pasture. The cobalt deficiency was making itself felt; 40 of the heifers died and the balance were kept alive only by sending them on to healthy swamp country. In 1932, 100 springing Friesian heifers were bought in the autumn and milked in the following spring. A few calves were reared satisfactorily, because this was the first year limonite had been used on the property.

BENEFITS FROM TOPDRESSING AND COBALT

Good clover growth is essential if a satisfactory pasture is to be obtained.

Cow numbers had increased to 150 by 1934, from which time all replacements were reared on the farm. Limonite was used regularly and no trouble was experienced in rearing calves.

The maximum dairy production was obtained in 1936, when 31,000lb. of butterfat were produced from 150 cows. Little or no cropping was done for the cows, but 30 acres of silage and 50 acres of hay were made yearly. Topdressing was curtailed during the early stages of this period. No fertiliser went on the farm from 1930 to 1933, in which year a limited area was topdressed. By 1935, 30 tons of superphosphate were being used each year, while lime was being applied yearly, 15 tons being used at the rate of 3cwt. per acre.

During this period there was also a large-scale venture into pigs. The size of the property gave ample room for a good pig layout, and the need to utilise fully the supplies of separated milk encouraged the farmer to exploit pigs to the utmost. Every year about 12 acres of maize and kumikumis were grown for pig food and up to 200 stores were wintered.

It was during this period that ragwort started to assume menacing proportions and soon became an increasing problem requiring many days spent each year on spraying and dusting. Even so the property was so large and had so many gullies and sidlings that complete control was virtually impossible. At the same time the rabbits became a serious pest, on several occasions over 60 being shot in less than 2 hours on the front of the property alone. They were far thicker at the back of the farm. The drastic change from cattle to dairying coupled with the lack of topdressing during the slump period, and the invasion of ragwort and rabbits resulted in a serious deterioration in the pastures, especially on the back of the farm. The only paddocks which maintained a good sward were the night paddocks and those which received the limited amount of fertiliser used between 1933 and 1935.

With the rise in farm produce prices from 1934 onward, the amount of topdressing used increased to a maximum of 40 tons in 1939, and the back paddocks started to pick up a little. Even so the leeway of the depression was never fully overtaken and with the outbreak of war in 1939 many of the back paddocks were still poor.

In 1937 the farmer realised that he would have to carry sheep or the ragwort would drive him off the property, and in 1938 he purchased 300 breeding ewes. In a few weeks these had been reduced to 140 through an outbreak of facial eczema.

BENEFITS FROM TOPDRESSING AND COBALT . . .

It was in this period that cobalt was introduced as a cure for cattle sickness. Limonite was first used on this property in licks in 1932 and cobalt in 1935 as a lick and later in the topdressing.

From the time it first came on to the market the farmer has used nothing but cobaltised fertiliser.

Change from Dairying to Sheep Farming

The fifth period, from 1939 to 1949, includes the war years, during which the change-over from dairying to sheep was made. Because of fertiliser rationing the amount of fertiliser used over the war years was cut down to 11 tons yearly and the pastures at the back of the farm deteriorated still further.

The last crop grown was 12 acres of maize in 1940 for pig food, and the grass-seed mixture sown after this crop (all Certified seed when available) was:—

	lb.
Perennial ryegrass	8
Italian ryegrass	8
Paspalum	7
Cocksfoot	3
Red clover	5
White clover	2
Subterranean clover ..	½

In 1942 a rabbit board was set up in the area and the operations of this board have brought the rabbit pest completely under control.

In 1940 the herd was gradually changed over to Jerseys, Jersey bulls being used, Friesian heifers being sold, and Jerseys bought. This change-over continued until the herd consisted finally of all Jerseys.

In 1939 to deal with the ragwort problem 400 6-year-old ewes were bought and the herd was cut down to 120 cows. The ewes were grazed on land topdressed with cobalt and were drenched with cobalt and did well. They had 414 lambs of which 380 were sold fat off the mothers, and 10lb. of wool per ewe was produced.

From this time sheep numbers were increased by 300 yearly to 1200 and the herd correspondingly reduced to 70 cows in 1944. This stocking was maintained until 1947. The herd averaged 15,000lb. of butterfat and the lambing percentage was 102, 70 per cent. of the lambs being sold fat off the mothers. In 1947 the herd was sold and sheep numbers increased to 1850 ewes. With the introduction of sheep the ragwort was soon brought under control and today the weed is well in check.

The increase in sheep numbers from 1200 to 1850 was made up of bought-in 2-tooth ewes. The policy now is to buy in about 450 2-tooth ewes and sell the same number of ageing ewes, mostly fat.

The fertiliser usage increased to 45 tons in 1949, and with fertiliser rationing removed the programme includes the use of 60 tons of serpentine superphosphate yearly, half of it cobaltised. Since serpentine superphosphate came on to the market it has been used on this property and the farmer is well satisfied with the results he has had from it.

Present Position

Today the farm consists of 20 paddocks, all sheep-proof fenced. Most of the posts on the farm are concrete and this property was one of the first in the district to have concrete posts used in a fenceline. This was in 1920 and posts made at that time are still in excellent condition. All the paddocks are watered, those at the front with troughs and those at the back by streams.

Pastures still show a great variation from the front to the back of the farm. The better paddocks contain ryegrass, white clover, red clover, and paspalum as the dominant species, while at the back pastures consist of ryegrass, crested dogstail, subterranean clover, a little cocksfoot, ratstail, hairgrass, danthonia, and flat weeds. A sledge track to the back of the property, which was constructed in 1903, has been bulldozed into a road to allow truck access.

The grazing management is based upon the principles of rotational grazing. Last year set stocking of ewes was attempted, but they did not thrive and the practice was discontinued. This season they are being rotationally grazed for the greater part of the year, paddocks being spelled and grazed for equal periods, and cattle are being used to clean up any rough growth. As lambing time approaches in August the ewes are broken up into mobs of 200 to 300 and put into paddocks where they are left until the bulk of the lambs are 2 to 3 weeks old. The mobs are then bulked up and rotationally grazed, any late lambs being kept with their mothers in a separate mob and put on to the best feed available. About 60 per cent. of the lambs are fattened off the mothers, the balance usually being sold as stores in mid-January.

All replacements are bought in. At first 5- and 6-year-old crossbred ewes were bought yearly, but now 500 2-tooth ewes are bought yearly from the east coast. Southdown rams are used. The farmer hopes to be able to plough up one of the poorer pastures at the back of the farm each year and resow into grass, and an attempt will be made to renovate other paddocks with better species of grasses and clovers. Twenty-four acres of meadow hay are cut yearly, plus 12 acres of lucerne sown down in 1941 and giving five cuts annually. Hay is fed to cattle only and is all stacked.

CHANGES IN STOCK ON TE PUKE FARM

Year	Stock carried	Stock units
1902	60 stores wintered	40
1912	180 stores wintered	120
1930	300 stores wintered and fattened	240
1934	150 dairy cows plus replacements	180
1938	150 dairy cows plus replacements, 300 breeding ewes	230
1940	120 dairy cows plus replacements, 500 breeding ewes	230
1944	70 dairy cows plus replacements, 1200 breeding ewes	285
1947	75 dairy heifers, 1850 breeding ewes	360
1949	60 mature cattle, 1850 breeding ewes, 45 heifers, 35 calves	395

In 1947 no beef cattle were kept to control pastures, the farmer running 75 dairy heifers. This was not a success as far as pasture control was concerned. Once they were disposed of the farmer stocked up with run cattle, and today the property is carrying 1600 breeding ewes, 200 bought-in wethers, 40 Southdown rams, 50 Polled Angus breeding cows, 45 in-calf Polled Angus heifers, 35 Polled Angus weaner calves, 10 other cattle including house cows and bulls, 2 working horses, and 3 hacks.

The farmer aims to breed his own run cattle, running 100 breeding cows and selling the surplus stock as required, to keep the balance of grazing right for the sheep. Last year the farm production was 1751 lambs of which 1000 were sold fat off the mothers, 510 as good autumn stores, and 160 kept on the farm and sold as early winter stores. The balance were kept on the farm as hoggets. Wool production averaged 8½lb. per ewe and no cattle were sold. Today the pastures are building up again, the ragwort is under control, and the rabbit menace has been removed by the action of the rabbit board.

Rise in Sheep Numbers

The spectacular rise in sheep numbers already quoted is sufficient to indicate the big swing there has been over to sheep in the Tauranga County, and many of these sheep are grazing on country which 20 years ago was impossible for sheep production. The table at the bottom of this page will illustrate the increase in the carrying capacity of the property over the years. (An attempt has been made to convert the various classes of stock into terms of stock units where 1 stock unit equals 1 dairy cow producing about 200lb. of fat in a season.)

The factors used in conversion have been worked roughly from feeding standards; the figures are approximate only, but give a reasonable picture of the productive progress of the farm.

There is an excellent range of buildings on the farm including woolshed and sheepyards, dairy shed, and piggeries. A spray dip is being installed. There is the usual range of haymaking equipment, topdresser, harrows, etc., all work on the farm being done with horses and the farm truck. Labour on the farm consists of the farmer and his son and a hired man.

The history of this farm epitomises productive trends over much of Tauranga County during the past 40 or 50 years and illustrates the parts played by topdressing, cobalt, and Certified seeds in the upward trend of primary production.

◆

Raising Bedding Plants for the Flower Garden

THE raising of bedding plants at home for use in the annual borders is a fascinating part of gardening. In view of the simplicity and cheapness of the practice, why it is not carried out much more widely is hard to understand. In this month's article for the flower gardener, C. K. Ellis, Horticultural Instructor, Department of Agriculture, Dunedin, describes the method of raising annuals to the stage where they are placed in their flowering positions in beds and borders. The commoner diseases of the flower garden and the sprays in general use are also discussed.

HARDY ANNUALS are usually sown where they are to grow and flower and are not difficult subjects for either amateur or professional gardeners. However, the more tender, half-hardy annuals are normally sown in seed-pans, pots, or boxes and are given the protection of a cold frame, greenhouse, or sheltering wall.

Cleanliness Essential

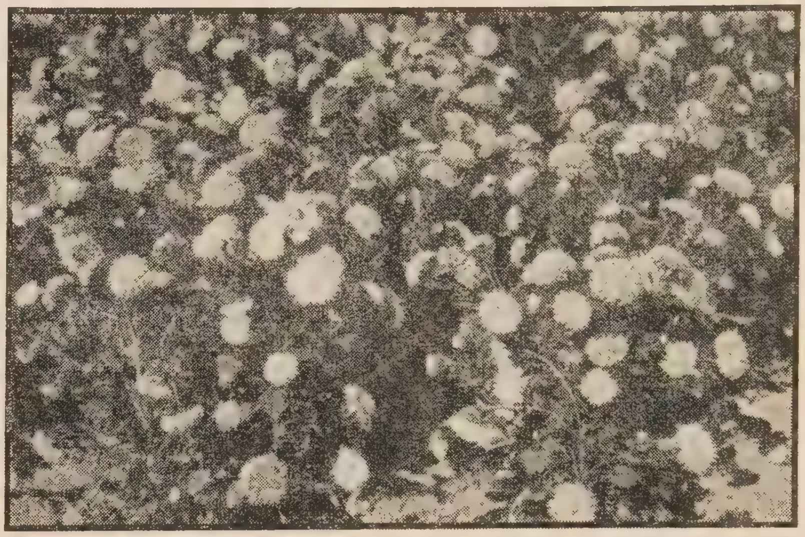
The importance of sterilising soils for seed raising should never be overlooked, and the methods of sterilising available to the amateur are referred to toward the end of this article. However, sterilisation of the soil alone is not sufficient, for putting clean soil in dirty containers is a waste of effort.

If new boxes are to be used, they should first be painted with some type of wood preservative (but not creosote) which will prolong the lives of the boxes and discourage harmful fungi. Old boxes, pots, and pans must be thoroughly cleaned and washed free of mosses, algae, and fungi. If the time is available, old materials can be partially sterilised by spraying them with 4 per cent. formalin. Benches, floors, and tools should be clean.

These precautionary steps should always be taken before sterilised seed composts are placed in the receptacles.

The Soil Mixture

Garden soils vary so much that recommending a simple standard mixture which will give adequate results is difficult, but no mixture could be better than the following, which may be used for both seed sowing and the subsequent pricking out of the seedlings: 2 parts by bulk of sterilised medium loam; 1 part by bulk of peat, leaf mould, or good, pulverised, composted material; and 1 part by bulk of coarse sand. All constituents should be passed through a ⅜in. sieve, and to the mixture should be added 1½oz. of basic superphosphate and ¾oz. of carbonate of lime to each bushel of the compost.

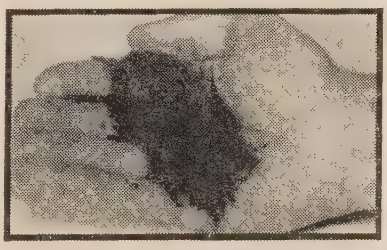


[*Green and Hahn Ltd. photo.*

The home gardener may easily obtain a display of asters such as this by raising the plants in the way described in this article.

The components must be mixed thoroughly. A good way is to spread the loam evenly on the floor, spread the peat on top of it, and finally spread the sand, with which the lime and superphosphate should have already been mixed. The mixing should then be done with a shovel, strip by strip. As the mixture is turned it should again be spread in an even layer, and the operation must be repeated three times before the soil can be considered properly mixed. The "structure" of the soil in a seed-box mixture is important.

A mixture can be considered ready for use only when it has the correct water content, and that can be judged by taking a handful of the soil and compressing it slightly by clenching the fist. When the fist is reopened the compost should more or less retain its shape in the ball, with perhaps a crack or two in it, and should leave no moisture or sticky muddiness on the fingers. Should the soil crumble on release of the grip, it is too dry; if it remains in a sticky mass and leaves moisture on the fingers, it is too wet.



[*Photo News Ltd. photo.*

Soil in the correct condition for use in seed-boxes or pots should look like this when the hand is opened after compressing it slightly.

The mixture must be in the correct condition before it is used. Sowing the seeds and endeavouring to correct the condition later is useless.

The boxes should be no more than 4in. deep—a greater depth of soil is not necessary—and should have the boards on the bottom spaced a little to allow free drainage of water. A layer about ½in. thick of any organic material such as spent hops assists drainage.

The box is filled loosely with the compost until it reaches above the level of the sides, and the level is reduced to that of the sides by striking off the surplus with a piece of board. The soil is pressed down firmly at the edges and at the corners with the fingers or a rammer, thus ensuring that it does not dry out rapidly near the outside of the box and that water does not cause depressions in corners. Then the rest of the soil may be firmed down with a piece of wood in such a way that the surface is level when the job is finished. If the surface is not level, water will run into the lower areas and cause uneven watering, which greatly affects germination and growth of the seedlings. The soil surface should be about ½in. below the edges of the box to allow room for covering the seeds and for subsequent watering.

If pots or pans are to be used. drainage is specially important. Each receptacle should contain a large crock, concave side down, over the drainage hole, with several smaller crocks over and around it. A thin layer of fibrous material on top of the crocks prevents the soil being washed down, which would hinder drainage and cause slumping of the soil surface. These receptacles are filled with compost in the same way as are boxes.

Sowing the Seeds

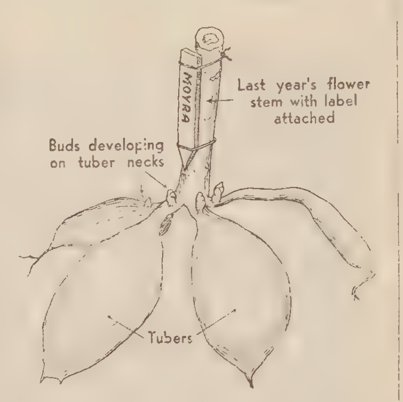
In normal circumstances, if the instructions given so far are carried out and the seed is of reasonably good quality, germination can be expected to be good. Therefore, all seed should be sown thinly.

The sowing may be done in a variety of ways: More experienced growers usually sow seed directly from the packet, but it may be sown pinch by pinch or even shaken over the box from a salt or pepper shaker.

Even spreading of the seeds is essential, and if the seeds are large, it is worth while to sow them one by one in some sort of geometrical pattern. Damping-off is less likely to spread in well-spaced seedlings.

Usually only one variety is sown in each receptacle, but if small numbers of plants are required, boxes may be divided into sections by placing strips of bamboo across the surface, or by inserting in the soil strips of glass or wood which just reach across the box, thus reducing the possibility of the seeds being mixed when they are watered. Alternatively, small drills may be made with a stick or with a finger and each variety sown separately. Varieties should be labelled at this stage. Seeds should be sown to a depth about three times their diameter.

A sieve with a mesh no finer than ⅛in. should be used to spread the covering over the seeds, for finer soil tends to crack or cake after being watered. The covering material need not necessarily be soil; river sand or other gritty material, other than oyster or shell grit, is just as good provided it is passed through a fine-meshed sieve.


MOYRA
Last year's flower stem with label attached
Buds developing on tuber necks
Tubers

Shortly after dahlia tubers have been boxed up and placed in a warm position shoots suitable for cuttings will appear about the points indicated.

Before and after Germination

After the seed has been sown sheets of glass should be placed over the boxes to prevent the escape of moisture, and a sheet of brown paper should be placed over the glass to prevent the entry of bright sunlight and to assist in reducing evaporation. The boxes should be placed in a warm, shaded position in a greenhouse or garden frame or in a sheltered position in the open. The boxes must be inspected daily, but the glass should not be turned frequently, for this removes moisture and hastens the drying out of the receptacles.

[Green and Hahn Ltd. photo.

The seedlings in this box were left for too long before being pricked out, and consequently the stems would be long and weak. Plants are best pricked out when they are at the seed-leaf stage.

Immediately the seeds have germinated—that is, when the seed leaves appear—the paper should be removed to prevent the seedlings becoming drawn. Soon afterward, provided the weather is favourable, the glass should also be removed.

The seedlings require close attention at this stage. If the soil starts to dry out, water should be applied carefully with a fine rose and the seedlings covered with scrim or newspaper to protect them from the fiercest rays of the sun, but this cover must be removed immediately the danger has passed.

Then is the time to watch closely for "damping-off" fungus, which is referred to under the heading "Fungous Diseases."

Pricking Out the Seedlings

Recent experiments have shown that seedlings are best pricked out at the earliest possible stage. The earliest convenient time with most annual border plants is the seed-leaf stage.

The boxes to be used should be filled in the same way as for seed sowing and with the same compost. An accurate pattern should be marked out on the surface of the soil to show the position into which each seedling is to be pricked out.

A few hours before the plants are to be pricked out, or even the night before, the seedling boxes should be watered thoroughly to minimise root damage when the seedlings are being lifted from the soil. The soil should be loosened with a knife or dibble and the seedlings removed from it carefully, one by one, held gently with the thumb and forefinger by one of the seed leaves. They must never be held by the stems because they are exceptionally easily bruised, and bruised areas are usually attacked first by fungi.

The dibble—a short, cone-shaped piece of wood—is used to push a hole in the soil of the pricking-out box and the seedling is lowered into the hole with its roots vertical and the seed leaves just above the soil level. The hole is filled in by pressing the soil gently to the roots with the dibble and the fingers. As each box is filled it should be watered lightly with a fine rose.

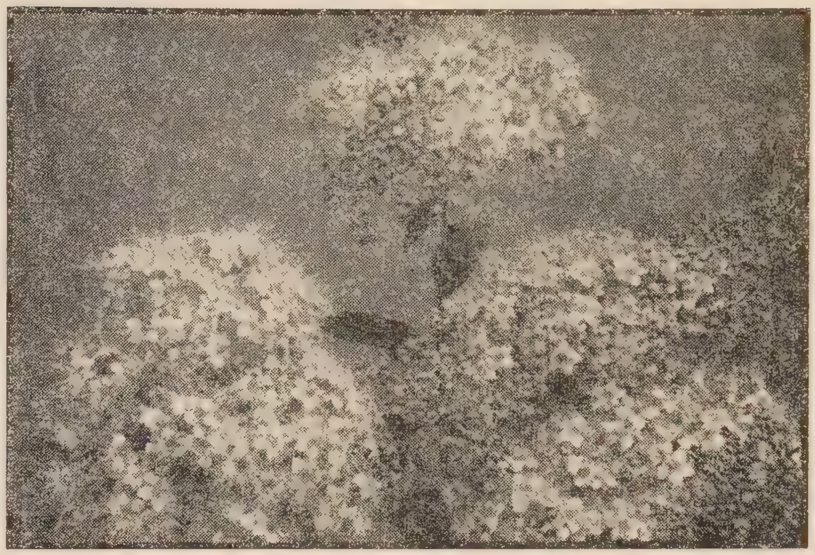
Once this operation has been completed there is little to do except to keep a close watch for damping-off or other diseases, to keep the soil moist, and to maintain adequate ventilation about the plants.

As soon as the plants are big enough they should be planted out. Plants held in boxes too long tend to become starved and lose their vigour, which they seldom regain under normal conditions.

Garden Work for August

Begonia tubers can be started into growth during August. Inspect each tuber carefully, cut away any diseased or rotted portions with a sharp knife, and dust the cut surfaces with flowers of sulphur. Half bury the tubers in a good, fibrous soil in boxes, sprinkle them with water, and place them in a warm position—in a greenhouse if possible. Do not water them too much.

WORK FOR THE FLOWER GARDENER



[Douglas Elliott photo.

Shrubs such as *Spiraea japonica* Anthony Waterer, which flower on the new season's wood, should be pruned in August.

Cultivation of flower borders at this time of year is important, for the soil is likely to become caked after late-winter and spring rains and winds. Shallow pricking over with a fork is the safest method because it minimises the danger of root damage.

Dahlias can be increased by cuttings, which can be taken soon. Select the varieties to be increased, place the tubers in boxes of soil, and stand them in a greenhouse or frame. New shoots suitable for cuttings will soon appear.

Gladioli will not be planted in large numbers until September, but August is the time to prepare the soil. They do best in a deep, well-drained soil in a sunny, sheltered position.

Hydrangeas for pot culture should be started into growth in August by putting them in a warm place and watering them well. The top of the soil in each pot should be scratched away carefully and be replaced by a topdressing of new potting soil.

Seed of a wide range of bedding plants may be sown in greenhouses or frames in August. Among them are antirrhinum, salvia, *Cineraria maritima,* ageratum, ten-week stock, clarkia, cynoglossum, french marigold, petunia, viscaria, asters, Livingstone daisies, nemesia, gilia, and celosia.

Shrubs which flower on the new season's wood should be pruned in August. They should be cut hard to keep them shapely and to encourage as many new shoots as possible. Among the shrubs and climbers to be treated thus are *Clematis jackmani,* dogwoods, coral trees, willows with coloured bark, *Ceanothus* spp. (deciduous), *Hydrangea paniculata, Buddleia variabilis,* and *Spiraea japonica* Anthony Waterer.

Bacterial Diseases

Important bacterial diseases of ornamental plants in New Zealand include fireblight and citrus blast. Fireblight is the more serious, though citrus blast affects a much wider range of plants.

Fireblight

First reported in the Dominion in 1919, fireblight (*Erwinia amylovorus*) has since spread throughout the country. It attacks ornamental trees and shrubs of the *Rosaceae* family, including *Crataegus, Cotoneaster,* and *Pyrus* species. The bacteria overwinter in margins of cankers and in fruit spurs, becoming active in spring. Insects become contaminated with organisms when feeding and carry them to flowers and young shoots of plants in the vicinity. Infection of spring and summer shoots develops rapidly and often the bacteria are extruded in small beads of "ooze." These ooze droplets attract insects and form additional sources of infection during spring and summer. The foliage of attacked branches usually turns brownish and dies, the leaves remaining whole and attached to the branches or twigs. The ooze is most likely to be detected in spring and early summer.

The home gardener who finds infection among his trees should first eliminate cankered branches and destroy badly infected trees and shrubs. In the case of a particularly valuable specimen the canker may be removed by cutting away the infected bark and infected wood, plus a wide margin of apparently healthy tissue, and sterilising the wound with a mixture of ¼oz. of mercuric chloride, ⅛ pint of concentrated hydrochloric acid, and 11 pints of water. The instruments used during the operation should also be sterilised and all infected portions removed should be destroyed. When the sterilising solution has dried out completely the wound should be painted over with liquid coal tar.

Hydrangeas are fine subjects for pot culture. During August the dormant plants should be started into growth for the coming season.

Citrus Blast

Though not as serious as fireblight because it causes less damage and is more readily controlled, citrus canker (*Pseudomonas syringae*) causes a blackening of terminal shoots and of leaves or parts of leaves, and is sometimes confused with fireblight infection, though diseased shoots dry out more quickly and leaves become brittle. Infection usually follows injury of host plants by frosts, hail, or cold winds, and consequently young growth is most seriously damaged. Large stems and branches are not affected.

As infection occurs on young growth during cold weather, it is advisable not to force luxuriant growth in early spring or late autumn. Young growth can be protected adequately by applications of 3:4:50 Bordeaux mixture.

Fungous Diseases

Black Spot

Usually appearing in early summer, the first indication of the presence of black spot of roses (*Diplocarpon rosae*) is purple-brown spots on the foliage. Defoliation may follow heavy infection, and in this case all fallen leaves must be gathered and burnt, as the spores overwinter in the soil, and a dressing of 8oz. of slaked lime per square yard applied to the soil surface during winter.

During July or August the dormant plants should be sprayed with 5:4:50 Bordeaux mixture, repeated about 3 weeks later provided growth has not begun. While the foliage is on the plants they may be sprayed with lime sulphur at the rate of 1½ tablespoons to 1 gallon of water, or with 3:4:50 Bordeaux mixture if it is feared that the plants may be susceptible to lime-sulphur injury. The developmental cycle of the fungus occupies about 14 days, so that spraying should be repeated every 10 days until the disease has disappeared.

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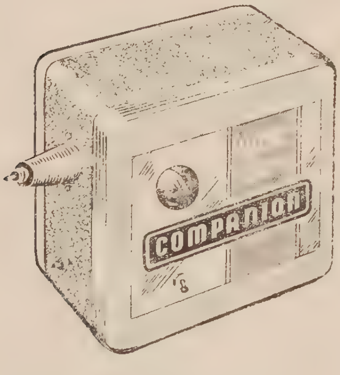

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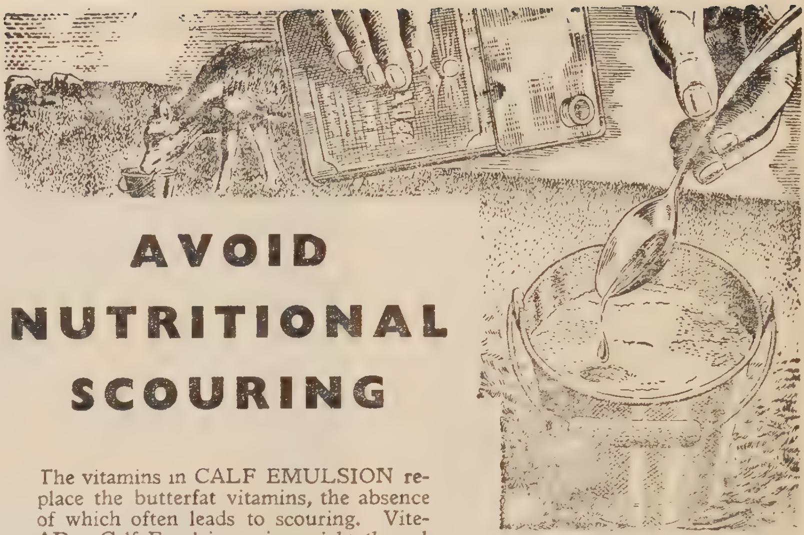

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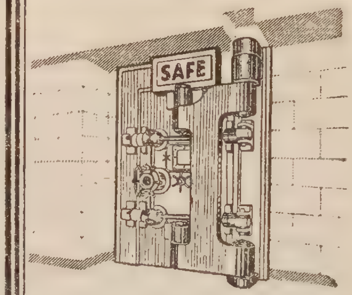

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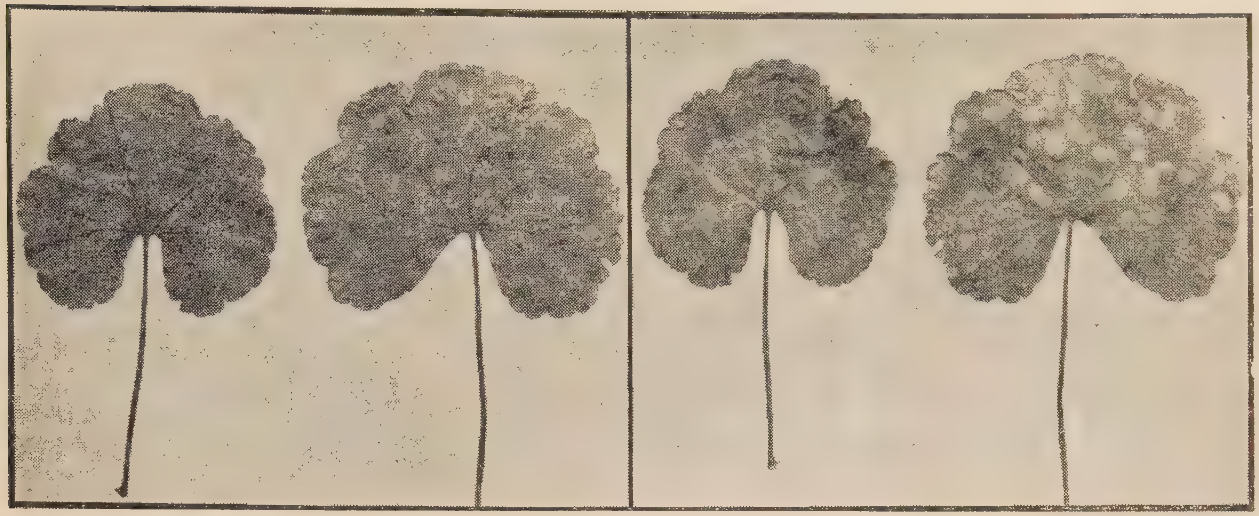


The undersides (left) of these geranium leaves show the fruiting bodies of two types of rust. The pustules are rich brown. The upper surfaces (right) show the characteristic yellow spots.

Mildew of Roses

Probably the most common disease of roses is mildew (*Sphaerotheca* sp.). Grey spots on the leaves are the first indication of its presence, these spreading rapidly until they cover the leaves and finally the young shoots, with a resultant loss of vigour and bloom. Some varieties of rose resist attack by mildew, but most of the softer, quicker-growing types are very susceptible.

Pruning, which keeps the plants open to the circulation of air and permits entry of sunlight, does much to prevent spread of the disease. Spraying with the lime-sulphur mixture recommended for black spot is useful as a controllant, as is dusting with flowers of sulphur.

Damping-off of Seedlings

The fungi given the popular name damping-off fungi (*Pythium, Rhizoctonia,* and other species) are those which attack seedlings, often severely, at or about ground level. Humid conditions encourage the growth of these fungi, and their effect on seedlings is to cause decay of the stem, usually in a confined region about the base, so that ultimately the plant topples over and dies. Partial control can be effected by the use of Cheshunt compound, the preparation of which is described under the heading of "Sprays."

Rusts

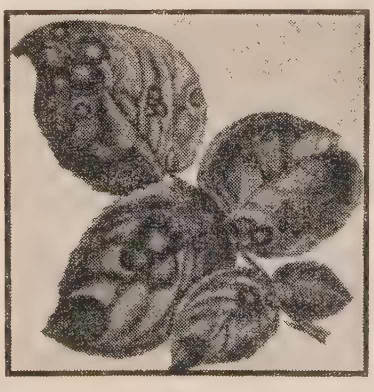
Many species and strains of rusts (*Puccinia* spp.) are present in New Zealand gardens. Their presence is evidenced by rusty spots on the leaves, which eventually wither and die, the plants often being debilitated seriously. Too many rusts are prevalent in flower gardens to allow a complete control schedule to be laid down, but undoubtedly the most satisfactory method of attacking them is spraying with one of the proprietary preparations of colloidal sulphur or lime sulphur. Burgundy mixture or Bordeaux mixture used at intervals of 10 to 14 days after infection has appeared, or lime sulphur (1:150) plus colloidal sulphur (2lb. of 50 per cent. to 100 gallons of water), also gives satisfactory control in most cases.

Botrytis Rot

Another fungous disease which attacks the stems of seedlings and young plants, botrytis rot (*Botrytis* spp.), first shows itself by a softening of the stem, followed by blackening and bending, and finally by the growth of a white, fluffy mould. When seedlings are attacked the best control measure is the use of Cheshunt compound. If larger plants are attacked, it is best to remove and destroy those infected and spray the remainder with Burgundy or Bordeaux mixture.

Sclerotinia

Causing rapid decay, sclerotinia rot (*Sclerotinia* spp.) attacks many plants, including petunias, zinnias, stocks, and wallflowers. Dead plants are usually black, but are covered by a white growth. Cheshunt compound is a useful preventive, but affected plants should be removed and burnt.



Black spot of roses is a disease which usually appears during early summer.

Adequate cultivation and correct spacing of plants are important factors in that they help to keep down humidity.

Mildew of Larkspurs

Larkspurs, delphiniums, and several related plants become infected with a mildew (*Erysiphe* sp.) which covers the leaves and stems with a white mould. This disease has a very marked effect on the vigour of the plant, and dusting with flowers of sulphur is the most convenient means of control.

Fungicidal Sprays

Cheshunt compound is prepared from copper sulphate and ammonium carbonate, finely powdered, in the proportions of 2oz. of copper sulphate to 11oz. of ammonium carbonate. These two chemicals should be mixed thoroughly and stored in an airtight jar. To prepare a spray 1oz. is dissolved in a little hot water and 2 gallons of cold water added; it should be used immediately.

Burgundy mixture, a mixture of copper sulphate and sodium carbonate (washing soda), is used instead of Bordeaux mixture mainly because it is easier to prepare and more pleasant to handle. However, it is less efficient than Bordeaux mixture as a fungicide and is likely to cause more damage to foliage, being incompatible with lead arsensate. The spray is prepared by mixing in a wooden vessel 6oz. of copper sulphate and 8oz. of sodium carbonate with 5 gallons of water.

Bordeaux mixture: The normal winter strength is usually written as 5:4:50, which indicates that the formula is 5lb. of copper sulphate, 4lb. of hydrated lime, and 50 gallons of water. The normal summer strength is 3:4:50. The spray is prepared by pouring three-quarters of the required quantity of water into a wooden mixing vessel and dissolving the copper sulphate in it; this should be stirred thoroughly to ensure that the bluestone is dissolved completely. The hydrated lime is weighed out and mixed to a thin paste with water. This is poured slowly into the mixing vessel and the rest of the water added. The mixture should be stirred thoroughly all the time and again before it is used.

Lime sulphur: The preparation of lime sulphur is too complicated and unpleasant a task to make it worth while for the home gardener, who is well advised to buy one of the reliable brands available if he requires this mixture. Its chief use is in controlling certain pests, such as red spiders and scale insects, while also fulfilling the requirements of a fungicide.

Sulphurs are recommended mainly for the control of mildew and rust, the most satisfactory form for spraying being colloidal sulphur. This cannot be prepared by the home gardener, but reliable brands may be bought. Colloidal sulphur for spraying should be used at the rate of 2 to 4lb. per 100 gallons of water.

Stomach-poison Insecticides

Such chewing insects as pear slug, bronze beetle, and leaf roller are attacked by sprays containing stomach poisons.

Arsenate of lead to be used for spraying should contain 33 per cent. arsenic pentoxide, of which no more than 0.2 per cent. should be water soluble. The usual dosage is 1½lb. of powder or 3lb. of paste per 100 gallons of water. Foliage of flowering peach trees is likely to be injured by arsenate of lead sprays, so a spray to be used against leaf roller should have 3lb. of hydrated lime added for each 1lb. of arsenate of lead, or if spray is bought for this one purpose, basic lead arsenate should be specified.

Contact Insecticides

Contact sprays are used against a large number of insects and mites, which they destroy by contact or asphyxiation. Almost all the contact sprays of use to the home gardener are proprietary preparations.

Winter spraying oil should contain a guaranteed percentage of oil, have a viscosity of not less than 85 seconds, an iodine value of not more than 30, and a volume of unsaturates of not more than 33 per cent. The volatility should also be low. For woolly aphis and scales this spray should be applied to dormant deciduous trees and shrubs at a concentration of 3 to 5 per cent. The use of winter oils on evergreen plants is inadvisable because of its burning effect on the leaves. These recommendations are based on the assumption that the oil content is 100 per cent.

Summer oil is used in the home garden principally to combat red spider, scales, and aphides. It is suitable for the spraying of most types of foliage during the growing season, and is normally used at concentrations of from 1 to 2 per cent. To soften hard water when oil emulsions are being mixed, washing soda may be added at the rate of 1lb. to each 100 gallons of water.

Nicotine sprays are fumigants. The spray most used has a nicotine sulphate content of 40 per cent. For outside use it is more costly and less efficient as an insecticide than summer oil, but in confined spaces such as glasshouses it is excellent for the control of aphides and white flies. For outdoor use it is applied at the rate of 1 part of 40 per cent. nicotine sulphate to 800 parts of water, which gives a concentration of 0.05 per cent. When this spray is used alone soft soap should be added at the rate of 3lb. per 100 gallons of water. A 0.04 per cent. concentration is sufficient under glass.

Garden Hygiene

Partial sterilisation of soils is a modern practice designed to destroy pests and diseases and indirectly to restore lost fertility. Three simple means of accomplishing this are available to the home gardener.

Formalin, at the rate of 1 pint to 40 gallons of water for each 10 sq. yds. of soil surface, is fairly effective. The surface should be covered with sacks for a week and then allowed to air for a fortnight before the ground is used.

Chloropicrin (tear gas) also is satisfactory, but few home gardeners have the injector necessary for the application of the chemical.

Low-pressure steam sterilisation can be carried out in the following manner: Insert in a copper or other convenient type of boiler a sheet of iron with small perforations, leaving enough clear space for at least a gallon of water in the bottom. Place the soil over the perforated iron and boil the copper for about an hour or until the temperature of the soil has risen to 200 degrees F. This method is useful in preparing soils for seed raising.

The burning of weeds and prunings from trees and shrubs and the removal of loose bark from trees deprive many pests and diseases of sheltering or breeding places.

The continuity of conditions favourable for the accumulation of pests and diseases in the soil can be broken by crop rotation. The same types of annuals and bulbs should not be grown in the one position year after year.

Diseased plants must be removed and destroyed immediately they are detected if further infection is to be avoided.

Careless use of implements often leads to injury of plants, thus making entry points for fungi. Pruning cuts should always be clean, and cuts more than ½in. in diameter should be sterilised and sealed with liquid coal tar.

Plants should be adequately spaced in the borders, otherwise they become weak, spindly, and less resistant to pest and disease attack.

Compost heaps are a potential breeding ground for pests and diseases. They should be turned regularly and should never have infested material added to them. Such material should be burnt.

Stable manure, though useful in many phases of gardening, can be a source of infestation by weed seeds, insects, and fungi.

Garrya elliptica

A DISTINCTIVE and handsome evergreen shrub, *Garrya elliptica* has dark green leaves like that of the evergreen oak and from May to September it bears clusters of long, drooping catkins of greenish-white flowers, sometimes up to 12in. long. Because of its larger catkins the male plant is the one in general cultivation; the female plant is rarely seen.

It should be planted in early autumn or late spring, preferably from a pot or when young, as it does not transplant readily when it becomes larger. It grows best in a rather dry, not over rich soil, preferably in a sheltered, sunny position facing north or east. Pruning is seldom necessary unless for shape, as the shrub is not fast growing.

G. elliptica may be propagated by making 3in. cuttings of the firm, young growth and inserting them in sand in a close frame during January or February. Layering in spring is another means of propagation if suitable growth for this purpose is available.

—*H. P. THOMAS, Vegetable Instructor,*
Department of Agriculture, Wanganui.

TEA

By NELL MACPHERSON, Rural Sociologist,
Department of Agriculture, Auckland.

ALTHOUGH the origin of the use of tea as a beverage has caused much speculation, it is thought that the Chinese Emperor Shen-Nung first started the habit of tea drinking in 2737 B.C. It later became widespread in Asia, particularly in Japan, where an elaborate ritual for tea drinking grew up, but tea was not at all common in Europe until many centuries later when the Dutch imported it from the East early in the seventeenth century. About ten years later in the same century it was brought overland to Russia.

THE custom of tea drinking soon had a wide appeal in Holland, where tea was thought to have medicinal qualities, but it was little more than a fashionable novelty in England till 1660. It first became popular in court circles where Catherine de Braganza, who brought the habit with her from Portugal, introduced it. From then on it became increasingly popular, though it was very expensive, averaging between 12s. and 13s. a pound and once even reaching £2 18s. 4d. a pound. In spite of the high cost, it soon became so extensively used among all classes of the community as to be the national beverage. This was regarded by foreign observers to be an indication of a tremendous wave of prosperity in England, whereas it was really an indication of a tremendous wave of smuggling. It was estimated at the time that probably two-thirds of the tea drunk in England was smuggled into the country.

For many years most of the tea used was China tea and it was not until 1839 that Indian tea was sold on the London market. Shortly after this it became possible to buy various types and blends of tea, and some of the wealthier people kept their own tea blenders and tasters.

Teas take their names from the countries in which they are grown, the method of curing the leaf, and the position of the leaf on the stem. They may be fermented, in which case they are black, or unfermented, when they are green, or partially fermented.

Teas are subdivided into broken grades, which are the smaller leaves and pieces sifted from the bulk or resulting from cutting, and leaf grades, which are the larger pieces and leaves.

Indian, Pakistan, Ceylon, Indonesian, and British African teas are nearly always black and are obtainable in Orange Pekoe, Pekoe, and Pekoe Souchong in leaf grades and Broken Orange Pekoe, Broken Pekoe, Broken Pekoe Souchong, Fannings, and Dust in broken grades.

China and Japanese teas are generally green teas: Young Hyson, Hyson Nos. 1 and 2, Gunpowder, Twankay, Fannings, and Dust.

Oolong tea, which is a partially fermented tea, is prepared in China and Formosa and comes in one grade only.

These grades are not an indication of quality, as that is affected by still other factors.

There are distinct differences in the flavour of these various grades of tea. For instance, many of the China teas seem to be rather sweet scented.

Unfortunately it is not possible to buy all these various grades of tea in New Zealand at present, though it is probable that in a few years they will be available again. At present it is possible to buy both blended Ceylon and blended China teas.

Cheap teas normally consist of a larger percentage of what is known in the trade as "common tea"; that is, tea grown at lower altitudes and poorly manufactured, and lacking the finer flavour or colour characteristic of high-grown and better teas.

Tea as a beverage can be drunk either hot or cold and can be made in many different ways with different flavourings added. An earthenware or china teapot is generally thought to be best to make tea in, but most enamel and silver teapots are quite satisfactory. It is important that the teapot should not be stained inside, as that can affect both the colour and flavour of the tea. This is more likely to occur where the water is hard and stains may be difficult to remove.

To make a good cup of tea the infusion or steeping method is best. The tea is steeped for a few minutes in hot water but must never be boiled, as that extracts the tannin from the leaves. Steeping tea for too long also extracts the tannin, which gives the tea a bitter, astringent flavour.

Bring the water to the boil, scald the teapot, and place in it 1 teaspoon of tea for each cup of water. Pour the

Packing a basket with morning tea.

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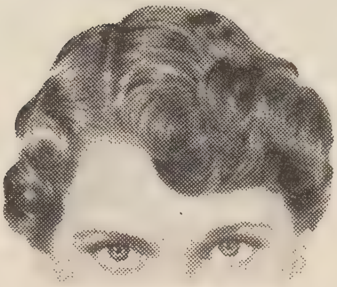

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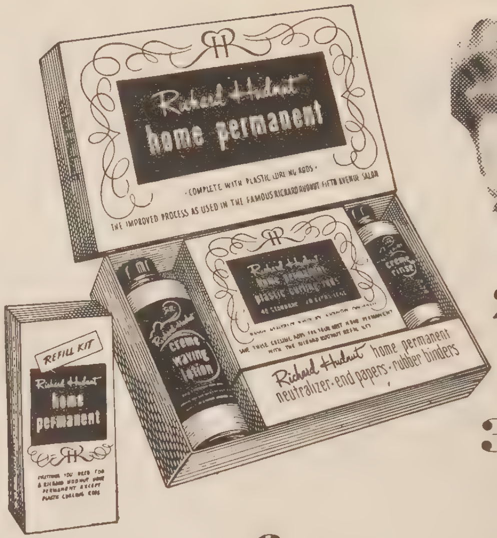
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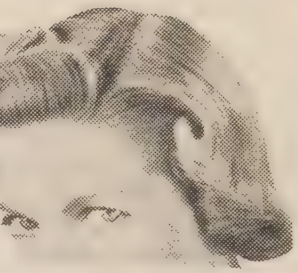

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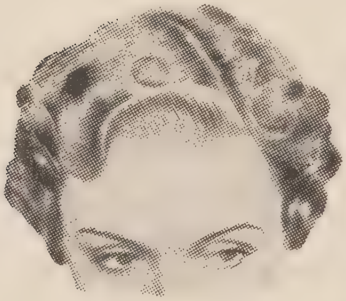

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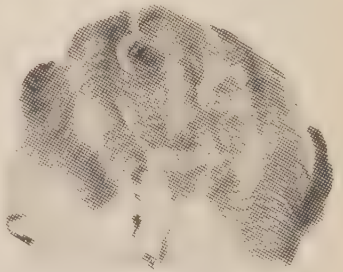

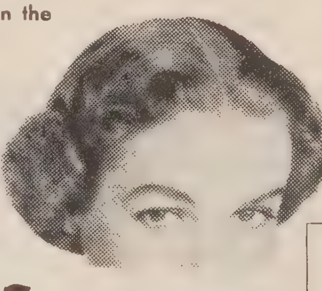

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boiling water over the tea and stand the teapot in a warm place for 3 minutes to extract the flavour and the theine, which is a mild stimulant and gives tea its refreshing quality.

Serve in a cup, preferably heated, with either milk or lemon. Sugar may be added if desired.

The use of a cosy to keep the teapot warm will ensure hotter tea. Before refilling a tea cup, always pour out the slops.

Green tea: Allow 1 teaspoon of tea per person. To swell the leaves so that the full flavour is extracted put the tea into a strainer or a teapot and pour on 1 cup of boiling water. Leave it for half a minute and then pour off the liquid and add 1 cup of boiling water to each teaspoon of tea. Leave for 3 minutes and serve with slices of lemon.

When making tea for a number of people it is usual to add 1 teaspoon of tea per person and 1 extra teaspoon of tea. The amount of tea used varies of course with the taste of the people for whom it is made.

Iced tea: Half fill "iced-tea" glasses with crushed ice or ice cubes. Fill the glasses with freshly made hot tea which is twice as strong as usual. The ice as it melts dilutes the tea to the right strength.

Serve the iced tea with sliced lemon or orange or with lemon juice.

If a refrigerator is available, variety may be given to iced tea by using lemon-juice cubes, ice cubes with slices of lemon or orange in them, or sprigs of mint.

A piece of non-crystallised orange peel may also be added to the tea leaves before the boiling water is poured on.

Another method of preparing iced tea is by making tea of ordinary strength, pouring it off after 3 minutes, and allowing it to cool, and later refrigerating it before serving. This tea sometimes becomes cloudy.

Spiced Tea

½ teaspoon of allspice
½ teaspoon of cloves
1 orange rind
1 stick of cinnamon
½ lemon rind
Water to cover

Simmer the ingredients together for 20 minutes. Make 4 cups of tea in the usual way, add to the spice mixture, and strain. Add 4 tablespoons of orange juice and 3 tablespoons of lemon juice and sugar to taste. Serve the spiced tea either hot or cold.

Billy tea: When making tea outdoors it is not necessary to use a teapot, as a very satisfactory "brew" can be made in a billy. Boil the billy of water over a fire and if it has no lid lay a green twig across the top to prevent the water from becoming smoked. When the water is boiling add the tea and remove the billy from the fire immediately. Leave it for 3 minutes before serving the tea.

Billy tea is also associated with "swaggers." Sometimes a swagger who was short of tea would drain off most of the liquid and leave the wet leaves in the billy for use at his next meal. This was not always a good idea, because if wet leaves were left in the billy overnight the tannic acid from them would dissolve the tinning on the billy and form a poisonous compound which when the billy was next boiled would make the drinkers sick.

Tea made in large quantities for seasonal operations such as fruit picking and threshing is not always a success. This difficulty may be overcome by preparing the tea in the house and carrying it down to the field in insulated containers. To every 50 workers an allowance of ¼lb. of tea may be made; this makes 3 gallons of tea. Estimate the amount of tea required and make it in the ordinary way in a large teapot or a billy. Pour it off into the containers. (Seven-pound syrup tins are a useful size when they are available, as they have tight-fitting lids.) Wrap the billies in newspaper and put them in a basket to carry them down from the house.

It is wiser not to add the milk to the tea until it is being served.

It is also possible to make the tea by putting the tea leaves in a muslin bag in the billy and pouring on the boiling water. Stir the bag round in the water for 3 minutes and then remove it and squeeze it lightly.

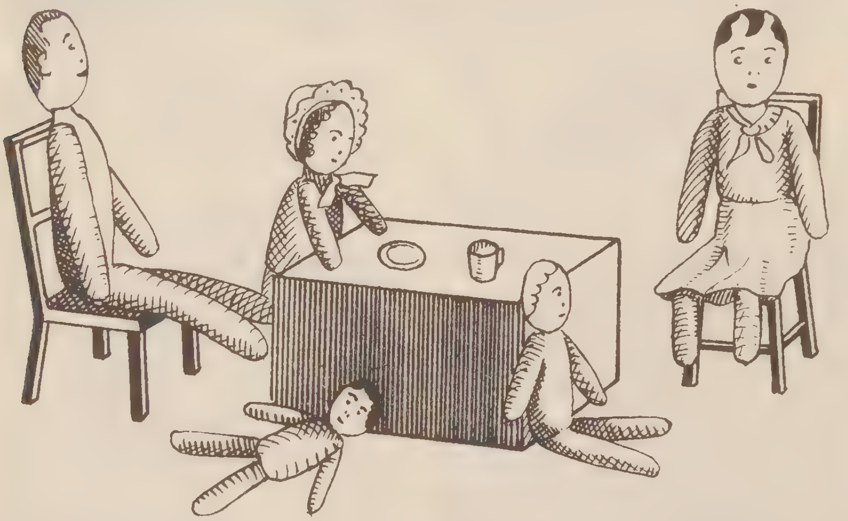
Tea is probably first favourite in the British Commonwealth as a beverage and is used in many different ways, from the formal afternoon tea and church soirée to "elevenses," "smoko," and that "nice cup of tea" enjoyed while listening to the radio.

[Photographs on this page by Sparrow Industrial Pictures Ltd.

Twin Dolls and Families of Dolls Can Give Meaning to a Child's Play

INTERESTING and sometimes helpful results may arise from giving a small daughter a pair of dolls exactly alike except that one is dressed in pink and one in blue.

SUCH dolls are easy to make. Their bodies, arms, and legs can be made of old sheeting or other available material and stuffed with cotton wool, discarded wool from spinning, or even cuttings of material. Strong cotton dresses, simply made, can be sewn on so that little hands cannot take them off; the whole dolls can then be washed in hot water and soap. Eyes, noses, and mouths can be drawn with indelible ink, and bonnets make for more attractiveness. Washable American cloth is a good material for the faces. There is no hair to pull off or eyes to remove.



Enlarging Scope of Play

The idea of having two dolls alike is that the child will tend to treat them differently and therefore the scope of doll play is enlarged. In fact, between the years of 2 and 4 this idea can be extended. The child may be given a set that roughly represents the family group—father, mother, sisters, brothers, and the child herself. Their identity need not be stressed; if they correspond roughly to the child's idea of the family group, she will soon pick up the idea. With a few pieces of simple dolls' furniture similar to that used in the daily life of the child the stage is set for much happy imaginative play in which the child relives events in the family life as they appear to her.

If the mother is sometimes able to plan her work so that she is near enough to watch and listen, without appearing to do so, probably she will learn something worth while of her child's developing life. She will find that a small child will dramatise an incident in or a section of family life that especially pleased or worried her, with herself as the centre, and so provide a clue to the emotions that were aroused in her by that incident. This also applies to small boys, of course.

Clue to Emotional Disturbances

This method is used sometimes in child-guidance clinics to discover the source of the trouble with children who become suddenly difficult to manage.

One little girl who had been difficult since her baby brother arrived was noticed putting the baby doll in the bed with the mother and father dolls. (She had seen the real baby in bed with her mother and father.) Suddenly she took the baby doll out of the bed, threw it in a corner, and put the doll representing herself in the bed. The incident showed that she felt she had lost her place in the affections of her mother and indicated jealousy of her baby brother. Her parents had not realised that they had dropped some of the little attentions and customs which had built up her security in their love. With the knowledge gained of the child's emotional difficulties they were able to set the situation right before much harm was done.

By watching and listening to such play parents can see a glimpse not only of a child's satisfactions but of her difficulties as she sorts out her feelings toward members of her family in situations which yield on the one hand satisfaction, love, and security, and on the other frustration, hate (expressed in anger), and insecurity. Much of interest, valuable and pleasurable to the parents in their relationship with their child, will be seen and heard, and the play is valuable and pleasurable to the child apart from anything it may reveal to the parents.

—DOROTHY JOHNSON,
Rural Sociologist,
Department of Agriculture,
Christchurch.

Using Scotch Tape

By EVELYN E. MOORE,
Rural Sociologist,
Department of Agriculture,
Palmerston North.

ONE of the most useful of the labour- and time-saving materials, and one of which plentiful supplies have at last become available in New Zealand, is scotch or cellulose tape.

IT first proved its value in the wrapping of parcels—in many town and country shops it is now a valued substitute for string—and the gaily patterned varieties quickly became popular at Christmas time for giving presents a festive air.

In the home it also has countless uses—for quick repair work, to hold a bandage in place, to mend a torn page in a book (the transparent varieties do not obscure the print), or to mend a small tear in a rubber or plastic raincoat (placed on the inside it is quite invisible).

The edges of plastic, which should never be tacked, can be held together with scotch tape while they are sewn, and if an end is left loose, it can be removed easily when no longer required. As it can be sewn over, it is more useful for this purpose than sticking plaster, which gums up the needle.

Scotch tape may be used to reinforce stitches on the tops of pockets in plastic aprons. It should be applied on the wrong side of the material, 1in. above the top of the pocket and 1in. down the seam. Other parts which are likely to tear may be reinforced similarly.

The housewife who is frequently annoyed by reels of cotton becoming unwound in her cotton box, but who finds the slots on cotton reels quickly get broken off, may place one strip of scotch tape across the end of each reel, sticky side up, and a second strip across the first to hold it in place. After each length of thread has been cut off, the end on the reel may be laid across the sticky tape, where it will stay until the cotton is used again.

The handy man may find a use for it when driving a nail into plaster to hang anything on a wall. Placing the tape on the wall and driving the nail through it prevents cracking and crumbling of the plaster and loosening of the nail.

Convenient small holders now available prevent the tape from becoming dirty and make it easy to unroll.

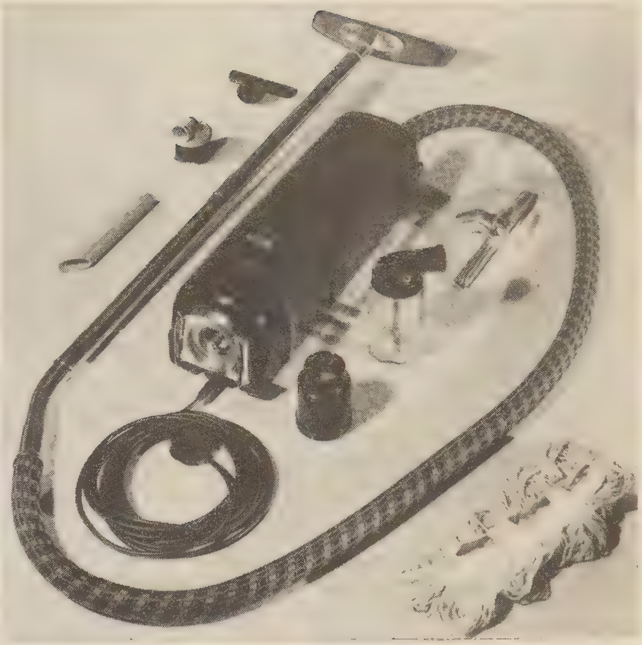
Scotch tape has many other uses which doubtless will occur to the housewife from time to time, and therefore is a useful addition to the household supplies in most homes.

ELECTRIC VACUUM CLEANERS

HOUSEWIVES today, who have to cope with most of the housework themselves, are particularly interested in labour-saving devices. But very often when they go to buy a piece of equipment there is little information available about the kinds on the market or what points to look for in making a choice. Also, in some households pieces of equipment lie idle because they are not suited to the work expected of them. Information on vacuum cleaners is given in this article by Edith G. McNab, Rural Sociologist, Department of Agriculture, Timaru, for those who plan to purchase a cleaner soon, and for those who desire to get the best results from the cleaner they have.

THERE are four important parts of a cleaner: The motor, the fan or impeller, the nozzle, and the container for the dust. All four parts affect the efficiency of the cleaner, and no one factor alone is sufficient to base a choice on. For example, the suction developed depends upon the design of the fan as well as the power of the motor; and the removal of dirt does not necessarily depend upon suction alone, for some cleaners have agitating devices which assist in this task.

[*Campbell Photography photo.*
A small hand cleaner which is useful for dusting furniture, stairs, and other places which are not easily cleaned with a large machine. Such a small cleaner in addition to a large one does away with the need for most of the attachments.



[*Campbell Photography photo.*
An internal dust-bag or canister type of cleaner. The cleaner is drawn along on skids, and has a foot switch. The large dusting brush is attached, and to the left of the machine are shown the upholstery nozzle, small dusting brush, and rubber tool for cleaning corners and crevices; to the right are the carpet nozzle, spray for polish, disinfectant, or paint, de-mothing attachment, and mop for fitting over the large dusting brush.

The internal dust-bag canister or tank type of cleaner usually has the bag, motor, and fan housed in a horizontal cylinder. The nozzle is usually at the end of a rigid tube connected to the cleaner by a flexible tube. The nozzle itself has no moving parts as a rule, but its position may be adjusted to reach under low-set furniture. This type of cleaner depends on suction alone for carpet cleaning, but may also depend on sweeping action when a brush is attached in place of the carpet nozzle. Dusting brushes of at least two sizes, for uncarpeted floors, furniture, and walls, are usually included in the accessories sold with the cleaner.

The external dust-bag or carriage type of cleaner is usually wheeled and arranged vertically. The cleaning action may depend on suction alone or on a combination of suction, beating, and sweeping, in which case the suction need not be so great, for the agitation assists in removing dust. The height of the nozzle and the handle are usually adjustable. As a rule the nozzle is wider than on the tank type, and it forms part of the frame of the machine.

Hand vacuum cleaners are useful for cleaning stairs and upholstery and for dusting furniture or skirting boards, but they are not available generally in New Zealand at present. In other countries they are sold as supplementary cleaners to the large carriage type at a price comparable to that of the set of attachments. Their advantage is that they are ready for immediate use and do not require the attachment of different tools as the large cleaner does if it is to be used for dusting furniture or cleaning upholstery.

The following remarks on the choice of a cleaner are of general application only. Particular makes of cleaner may differ in some degree from most other cleaners of their type. Before setting out to buy a cleaner one should consider the amount and kind of cleaning there is to do in the house. For large areas of carpet the carriage type of cleaner is suitable, for, with its large nozzle, it cleans carpet more quickly as a rule than the enclosed-bag type. For cleaning walls, draperies, and furniture suction is depended on, so if much cleaning of this kind is to be done, make sure the machine chosen has sufficient suction power. Some of the upright cleaners which use beating and sweeping to assist the suction in cleaning carpets do not need such powerful suction for this purpose, and for this reason may

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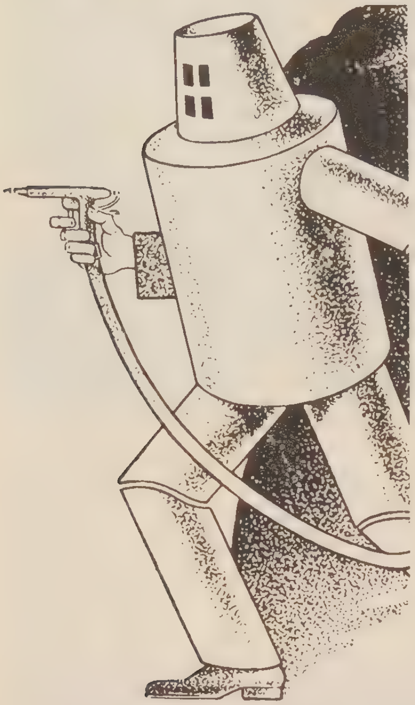

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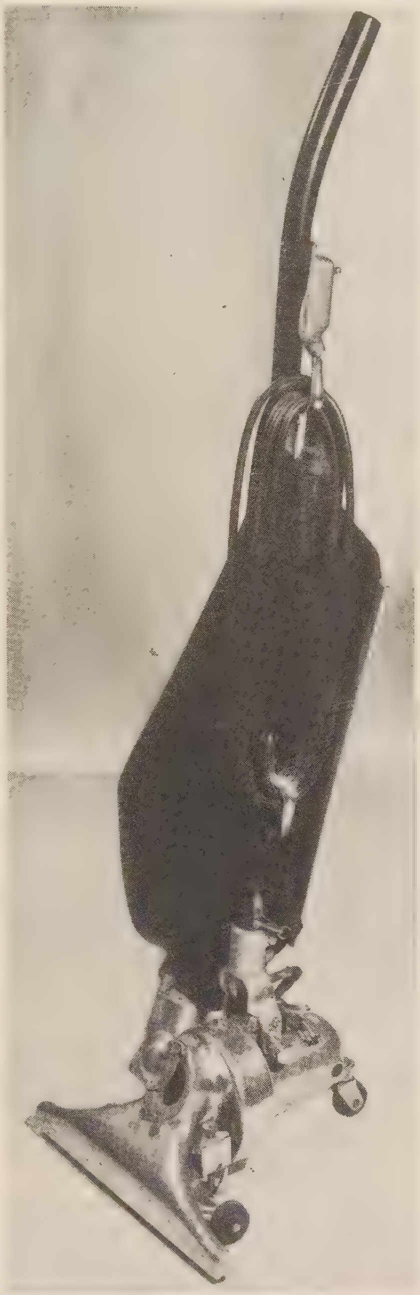
be less satisfactory for using with tools other than the carpet nozzle. However, some external-bag cleaners provide suction just as powerful as that of any tank type.

When most of the floors of a house are of wood or are covered in linoleum the internal dust-bag type may be the most useful kind of cleaner, for the large dusting brush can be used on these floors simply by changing it for the nozzle at the end of the rigid tube. The unsupported, upright external-bag type of cleaner is also useful for houses with fewer carpets, and is particularly good where there are stairs. One model of this type on the New Zealand market has a smaller nozzle than the wheeled kind of cleaner, so it is less useful for large areas of carpet.

Choose a cleaner which is convenient to operate. Consideration should be given to ease of handling, avoidance of stooping to turn the machine on or off or to adjust the handle, and easy removal and emptying of the dust-bag. If there are stairs in the house, the cleaner should not be too heavy to carry up them or too awkward to use on them. The attachments supplied with the cleaner should be capable of being easily and quickly put on and taken off. Any complicated arrangement for fixing on different tools will discourage their use and reduce the value of the machine as a labour saver. This is particularly important where the cleaner is wanted for a variety of work besides cleaning carpets. The kind of furniture in the house and its height from the floor will have an influence on the type of cleaner to choose, as if there is much heavy furniture, it may be better to buy a cleaner which will reach under furniture rather than that it should have to be moved every time the floor is to be cleaned. All tools and the nozzle of the cleaner should have guards which are usually made of rubber to avoid marking furniture or walls.

Cleaners which are ready for instant use when they are taken from the cupboard have an advantage over those which have to be partly dismantled when put away and fitted together again before use. Some women will use the carpet sweeper rather than set up the vacuum cleaner; therefore it is wise to arrange a convenient place for the cleaner so that it is no trouble to get it out ready for use. Some types of cleaner may be hung up; others have to stand on the floor of a cupboard or on a shelf.

When deciding what price to pay for a cleaner remember that price does not always bear much relation to the value of the machine as a labour saver. Consider durability and the cost of maintenance. Some cheaper kinds of cleaner require more maintenance—the "margin of abuse" may have been reduced—while sometimes cleaners have parts which have to be periodically renewed. A machine which has a high initial cost may be more economical in the long run than one which is cheaper to buy but does not give such long or reliable service; but a high-priced machine is not necessarily the most satisfactory one to buy. The high price may be due to more luxurious finish, which does not affect performance of work; it may be due to some "sales feature" which does not change the efficiency of the cleaner, or to the inclusion of more accessories, some of them of doubtful value. Make sure whether the price includes the attachments. It is generally more satisfactory to choose a make which is known to be reliable and which carries a guarantee.



[*Campbell Photography photo.*

An external-bag, upright type of cleaner. Notice the switch on the handle and the arrangement for coiling the flex. There is a foot control for the handle, and a screw adjustment for nozzle height. The nozzle is actually part of the frame of the machine. The cover for the part where the tube may be attached for cleaning walls and for using the accessories has been partly removed, so that the opening shows up. This cleaner has similar attachments to those shown with the other two large cleaners illustrated in this article.

When different purposes have to be served by the cleaner some compromise will have to be made, keeping in mind economy of time and energy and efficiency in producing results. The best cleaner for a particular purpose is one which will remove the most dirt with the least expenditure of time and energy. If the different types of cleaners are unfamiliar, it is best to try them out in the home if it is at all possible. Each kind of cleaner has advantages and disadvantages for particular purposes. Choose the one with the most advantages for the work which will be required of it.

Operation of a Vacuum Cleaner

Most makes of cleaner of either of the first two types of cleaner described on page 85 are supplied with dusting brushes, an upholstery tool for cleaning the space where back and seat meet in chairs or settees, and extension tubes for reaching walls and ceilings, as well as a carpet nozzle. The blowing end of some machines may be used, with appropriate attachments, for spraying, applying insecticide, or hair drying. With these tools a variety of tasks can be done. The versatility of a vacuum cleaner is little realised by women who use it on carpets only.

With the right tool on the cleaner in place of the nozzle, dust can be removed from almost any place in the house, and from almost any kind of surface. The small dusting brush will clean wire mattresses, remove dust from inside the piano, and from books, blinds, and curtains. The cleaner will keep dust off the floors of wardrobes or out of the corners of drawers. It will clean wickerwork easily, and the upholstery and floors of the car. Even clothes can be brushed with the vacuum cleaner and dust can be removed from pockets and purses. But if the cleaner is used to pick up the dust from ashtrays, the hearth, or stove, make sure that any burning has ceased, for a smouldering cigarette butt or a spark from the hearth may burn a hole in the dust-bag or do even more severe damage. A bag which has a hole in it must be replaced, for the hole will permit dust to leak from the bag into the room, and, in the case of some canister-type cleaners, the dust will block the air filter and greatly reduce the efficiency of the cleaner.

The bugbear of spring cleaning can be largely overcome by the use of the vacuum cleaner. Walls and ceilings can be dusted when necessary without first emptying the room of furniture or covering it all up, for the cleaner gathers up and does not spread the dust. The house need never become so dirty that a turnout on the grand scale is required. A little of the special cleaning can be done at a time, without causing any upheaval or requiring special preparations.

[*Campbell Photography photo.*

An unsupported, upright type of cleaner. It is light in weight so that the average woman could use it for cleaning walls as well as floors. Dusting brushes, a tool for small spaces and upholstery crevices, and an extension tube are shown with it. This cleaner takes little space to store. It can be hung up.

When using a vacuum cleaner to do ceiling, walls, and draperies in a room begin at the top and work downward, leaving the floor till last. Whether the dusting of furniture is done with the machine or with a duster it may be finished before running the cleaner over the floor. If no container is supplied for the attachments, make a box or bag with a handle so that they can be carried easily in one trip to the place where they are wanted.

For good results, cleaning a carpet with a vacuum cleaner should not be unduly hurried. A quick run over with the cleaner may remove surface litter, but may not get the dirt right out of the pile. It is the grit which gets right down in the pile which causes wear on the carpet, for the particles of grit may be sharp edged, and these sharp edges will cut the fibres of the pile when the carpet is walked on. So to get embedded particles out of carpets, the cleaner should be moved backward and forward slowly, with the nozzle correctly adjusted. If the nozzle is provided with a brush, it too should be correctly adjusted, according to the length of the pile of the carpet. A properly adjusted nozzle in a good cleaner will draw air up through the carpet, bringing the dust with it. The time to learn how to adjust the cleaner is when buying it. Generally, when correctly adjusted, the nozzle will lift the carpet slightly, or, if fitted with some kind of agitator, will make the carpet vibrate a little. The efficiency of a good cleaner in removing particles of grit from right down in the pile of a carpet is one of the reasons why vacuum cleaning has never been proved to be harder on carpets than other methods of cleaning. Beating, shaking, or brushing with a hard broom are methods of cleaning which are not easy on the carpet. Some carpet manufacturers recommend that vacuum cleaners should not be used on their products at first, but this depends on the type of floor covering in question. Loose fibres will be removed from new carpets no matter what method of cleaning is used. The thorough cleaning right to the edges of the carpet and under furniture which is possible with a vacuum cleaner tends to discourage moths. One big advantage of a vacuum cleaner is that the dust is gathered into the bag and not scattered as it is in other ways of cleaning carpets.

There are no definite rules about how often a vacuum cleaner should be used on a carpet, as this depends on how dirty the carpet gets. Daily cleaning may be necessary in some circumstances, while a weekly clean may be sufficient for a carpet in a room which is little used. Carpets near entrances should be cleaned frequently and thoroughly, for they will receive much traffic from outdoors and the gritty particles from streets and roads will wear the pile very quickly if they are not removed.

Care of a Vacuum Cleaner

Most dust containers are of closely woven cloth which retains the dust but lets the air through freely. The first essential is to keep the bag clean. The stream of air has to go out through the dust-bag, and if it is full of dirt the suction power is reduced. If some other container than a bag is used for the dust, it also must be emptied regularly. The dust may be emptied directly into the dustbin, or into a large sheet of paper and later burnt. The bag may be cleaned by brushing, doing the inside occasionally as well as the outside. Some makers recommend that the bag should be dry-cleaned from time to time; others brushing or shaking only. The dust-bag should not be washed. When leaking dust can be smelt it is time to renew the bag. If the cleaner has an air filter as well as a dust-bag, the filter should be renewed as instructed by the makers of the machine.

Sometimes the tubes leading from the nozzle may become blocked by a ball of fluff or piece of paper. The easiest way to remove the blockage is to remove the tube from the suction end of the machine and fit it on the blower end. Make sure the blocking material will be blown out where it will not make a mess.

The brushes should be kept very clean, particularly if they are to be used on light-coloured surfaces or on fabrics. Dust and lint can be removed from the brushes by cleaning them with the open end of the tube; just take off the last attachment used. Brushes may be washed also, taking the usual precautions to avoid spoiling the bristles. Wash the brushes in lukewarm suds made with neutral soap, rinse in lukewarm waters, and support them in some way so that they dry without any weight on the bristles, which should be hanging downward. Never pull hairs or threads which are wound round the bristles, but cut the hairs in several places and then remove them. When the brushes are worn have them replaced or have new bristles set in them. Keep all other accessories clean also.

Except when cleaning the brushes, never use the tube of the cleaner without one of the attachments on it. This helps to avoid the risk of damage through picking up some large, hard object. Nails, pins, or screws should be picked up before the cleaner is run over the floor. These may be quite sufficient to harm the fan, if allowed to be taken up by the cleaner.

As with all electrical equipment, good care must be taken of the flex. The plug, not the cord, should be gripped when disconnecting the cleaner. Avoid tugging the cord or getting it pulled tightly round corners. When the cleaner is not in use it is best to coil the flex loosely. A long flex is a convenience, as it saves having to connect up the cleaner in every room. It is better to replace a very worn flex than to run any risks with it. An electrician could advise on this point.

When buying a cleaner find out if it requires any special care such as regular replacements of any fittings, oiling, or care of the electric motor. Except for oiling, the maintenance of the motor should be left to an electrician. The seller of the machine should be able to give some idea of the length of time the cleaner can be expected to give satisfactory service without overhauling under conditions of light or heavy use. He should be able to provide information about the availability of overhauling and repair services. An instruction booklet is often provided with a new machine.

In conclusion, although an electric cleaner will clean carpets more thoroughly and easily than non-electric cleaners, and, although it will do so many other kinds of cleaning, it is not wise to buy such a cleaner unless satisfied that the expenditure on it will save more labour than if the money was spent on any other tool.

A WAIST PETTICOAT

By NELL MACPHERSON,
Rural Sociologist, Department of Agriculture, Auckland.

A USEFUL and easy-to-make addition to one's lingerie is a waist petticoat. It fits very smoothly, gives a good line over the hips, and is most useful to wear under a winter suit or under a skirt with a twin set or heavy jumper. Waist petticoats may be made in a variety of ways according to the purpose, and a pattern for a short waist petticoat can be lengthened easily to make a ballerina-length or full-length underskirt. They are also very useful for wearing under a frock which has a low or wide neckline or an off-the-shoulder décolletage.

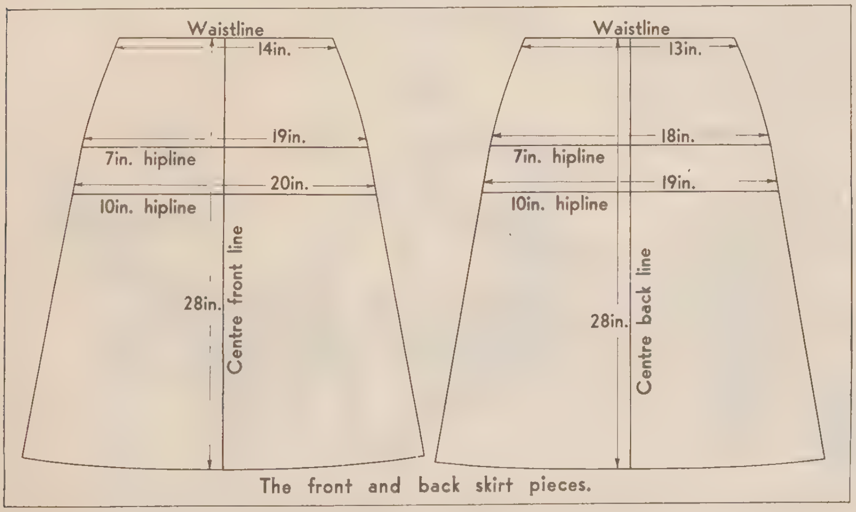
SOME of the materials which may be used are lawn, madapollam, cambric, fuji silk, lingerie silks, poplin, and taffeta. Satin, crepe de Chine, bemberg, and other rayons are also used. The trimmings may be of broderie anglaise, lace, pleated net, ribbon, or lace beading or insertion.

The materials needed for the pattern shown are 1⅝yds. of lingerie silk, 3yds. of lace, and matching silk substitute or cotton.

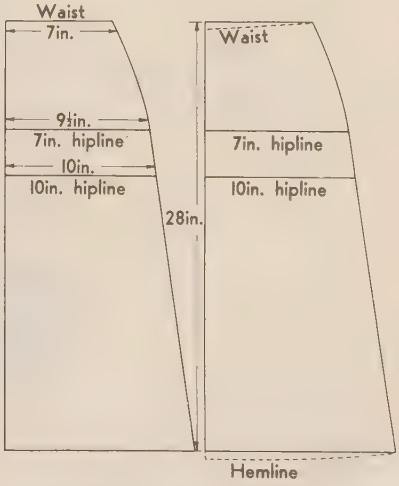
[Sparrow Industrial Pictures Ltd. photo.

Making the Pattern

Before the pattern is cut the following measurements must be known: The natural waistline, front and back; the front and back hipline at 7in. below the waist; the front and back hipline at 10in. below the waist; and centre front and centre back lengthwise measurements. The measurements for the pattern given are: Waist 27in., 7in. hipline 37in., 10in. hipline 39in., and length 28in.


Waistline
14in.
19in.
7in. hipline
20in.
10in. hipline
28in.
Centre front line
Waistline
13in.
18in.
7in. hipline
19in.
10in. hipline
28in.
Centre back line

The front and back skirt pieces.


Waist
7in.
9½in.
7in. hipline
10in.
10in. hipline
28in.
Waist
7in. hipline
10in. hipline
Hemline

Drafting the front pattern.

bewitching as the gentle pink of a sea-shell
enchanting as the subtle hue of a butterfly-wing
the colour that literally blossoms on your lips
it must be worn to be believed!
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Pink mist
Cashmere Bouquet
PINK MIST

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On a piece of brown paper or newspaper draw a straight line the length of the centre front line. Measure off the hip measurements at the 7in. line and the 10in. line. Halve the front waist and front hip measurements and mark them on the paper at the appropriate places. Join the 7in. hipline mark and the waist mark with a curve. Join the 10in. and 7in. hipline marks with a ruler and continue the line until the measurement from the waist to the hem is equal to the centre front line. Join the side line with the centre front line at the waist, but make it ½in. lower on the centre front line. Add ½in. to the bottom of the centre front line and join the side line to it with a slight curve.

Make the back skirt pattern in the same way as the front skirt but do not lower the centre back.

Allow ½in. for seams on the side line, waistline, and hemline and cut out the paper pattern.

Cutting out and Joining

Fold the material on the straight lengthwise grain and place the centre front and centre back on the fold.

Cut out the two pieces and tack them together with the right sides facing. At the left side of the garment leave a 5in. opening at the top of the seam; for larger figures this opening may need to be up to 7in. Try the garment on and adjust it to fit if necessary.

Join the pieces with french seams.

Continuous Placket

The placket is made next, and in fine material a continuous placket is best.

Cut a straight strip, preferably with one edge on the selvedge, 2in. wide and 2in. longer than twice the length of the opening; in the slip illustrated this was 12in. Tack it on to the opening with the right sides together. Ease it slightly at the seam in basting. Starting at the top, stitch by machine. Trim and turn in the free edge. Hem on to the line of machine stitching. Trim the top edge even with the waist.

[Sparrow Industrial Pictures Ltd. photo.

A petticoat with a gathered flounce.

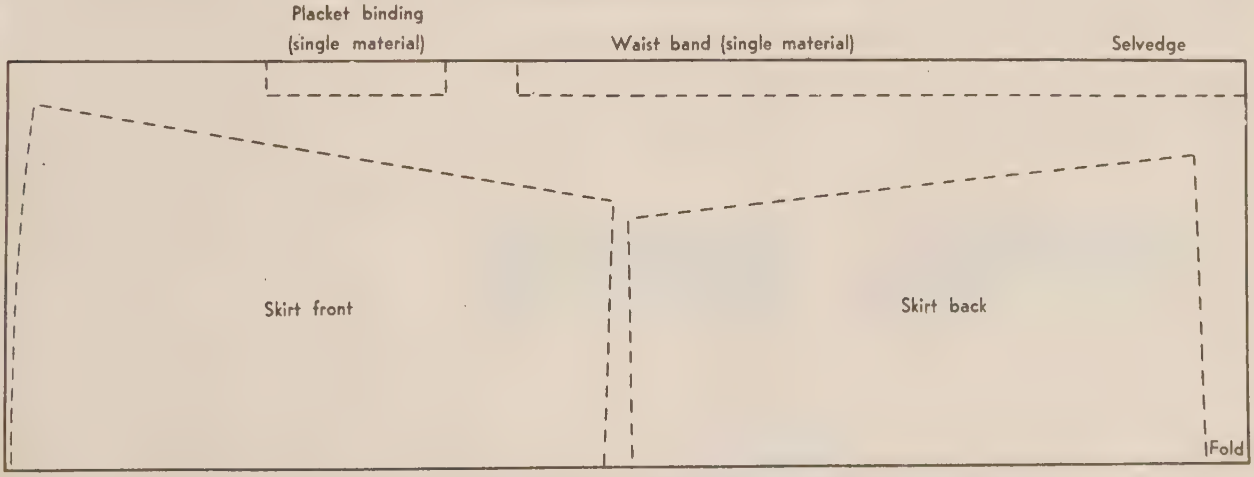
The Waist Band

A straight strip 2in. wide and 2in. longer than the waist measurement is needed for the waist band.

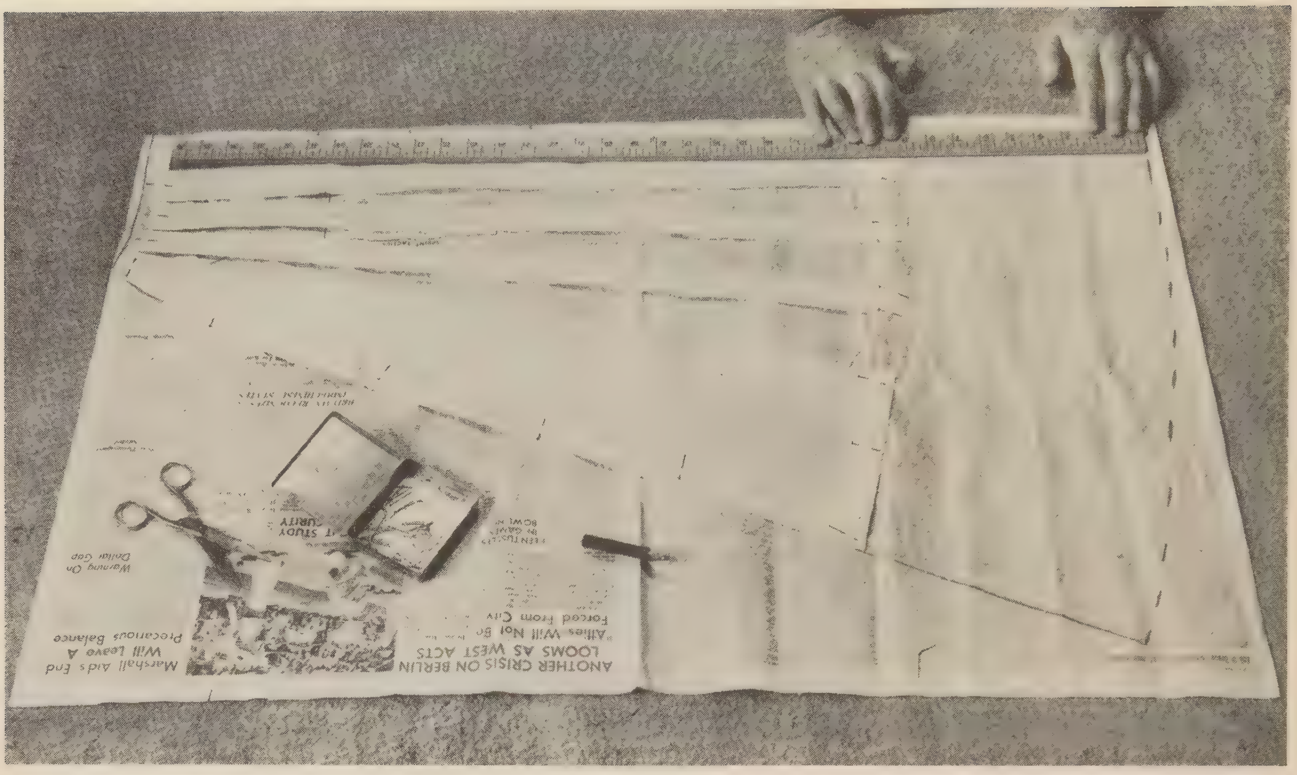
With the right sides of the material together, tack the strip to the waist of the petticoat, beginning at the back edge of the left side seam. Allow ½in. for turning in at the end. Stitch the band on by machine. Turn in the raw edges and hem on to the line of stitching. The ends of the band should be turned in and hemmed or slipstitched, or they may be buttonholed. There should be 1in. overlap on the front of the waist band.

Fastenings and Finishings

Sew on hooks and eyes and snap fasteners. Level the petticoat and finish the bottom edge with lace, which may be either rolled and whipped on or appliqued with satin stitch. If it is preferred, the bottom



The layout of the pattern pieces on the material.



Lengthening and spreading a pattern.

[*Sparrow Industrial Pictures Ltd. photos.*

may be finished with a shell edge or with a short gathered or pleated frill or flounce.

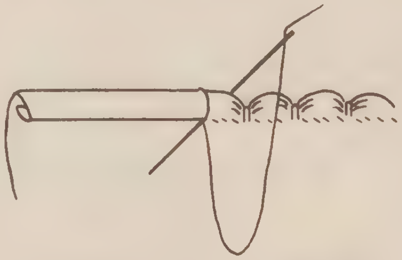
To make a flounce cut a straight strip one and a half times as long as the bottom edge and the desired depth. Run two gathering threads along one side of the frill and adjust it to the lower edge of the petticoat. It may be joined with a flat fell or french seam. The bottom edge may be finished with lace. Frilling may be bought by the yard at some stores, or the self material may be accordian pleated.

If a picot edge is desired, a piece of material twice the required width and half the length can be hemstitched down the centre by machine and the line of hemstitching cut through the centre.

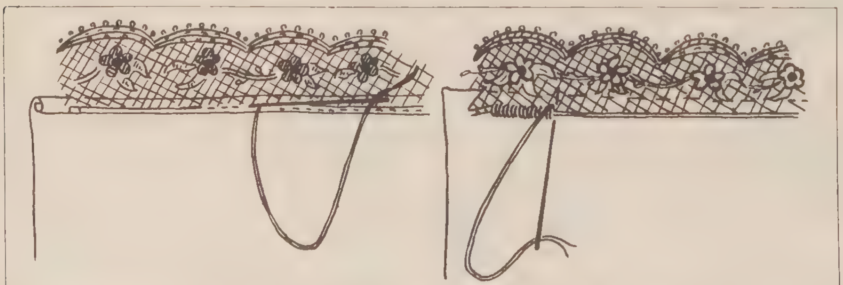
Variations of the Pattern

To make a ballerina or full-length underskirt the pattern should be cut and spread and lengthened as in the illustration above.

The short petticoat may also be made more attractive in several ways. The pattern may be cut about 12in. below the waistline to form a hip yoke and then have a straight piece gathered on for a skirt. This skirt may also be finished with a frill or with lace edging.



A shell edge for finishing the bottom of a petticoat.



Two ways of finishing the bottom edge with lace.

Another way of altering the pattern is to cut it 10in. and 20in. below the waistline and join the pieces with insertion; ribbon may be threaded through the insertion.

Beading may be used with ribbon threaded through it. This also makes a good finish for the joining of a frill.

By using broderie anglaise, cambric or Swiss embroidered organdie, and lawn a delightful garment may be made. The hip yoke is made of the cambric or lawn and the skirt is made of the broderie anglaise or Swiss organdie. The skirt may be pleated, tucked, or gathered on to the yoke or be joined by insertion.

Taffeta underskirts require slightly different treatment, as the short ones are used most often under tweed skirts. They are best cut fairly fitting to within 4in. of the knee and finished with a knife- or accordian-pleated flounce. The heavier and closer-woven material prevents the prickling and tickling of tweed.

A variation of the underskirt which does not require a pattern is made by cutting a straight piece of the desired length and gathering it at the waist with elastic thread. This gathering can be up to 7in. deep. This style is best made in fine material—for example, triple ninon. It does not give as smooth and fitting a line at the waist and hip as do the other styles, but if it is made in heavier material, it can pad out a too-thin figure.

Effects of Cooking and Preservation on Food Values

By **EVELYN E. MOORE,**
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THAT the preparation and cooking of food are two of the housewife's major tasks and, many would aver, the most interesting is born out by the fact that cookery books, according to most booksellers, are always among the best sellers. It is not sufficient only to be a good cook, however, for to provide a family with a healthful diet some knowledge of the most nutritious foods and the best way to cook them to preserve their value is also necessary. In fact, the proverbial remark that half the digestive ills of the world are caused by good cooks and the other half by bad cooks serves to emphasise the three major influences of cooking on food—its pronounced effects on palatability, digestibility, and nutritive value.

IN recent years a realisation of the importance of good nutrition in family health has resulted in the effect of cooking and preservation on the nutritional value of foods being much in the news, and has even produced a serious-minded cult of people who consider eating most of their food raw essential to health. That, of course, is unnecessary and, if carried to extremes, even harmful, for though poor cooking methods undoubtedly detract from the nutritive value of foods, good cooking often enhances it if factors other than a slight inevitable loss of some vitamins are considered.

Therefore it is desirable to know which methods of preparing and cooking foods best conserve the food value, and also, as the use of food preserved by bottling, canning, drying, or freezing has become common, whether their effects on nutritive value are sufficiently great to make it advisable to allow for losses by serving more of other foods which are good sources of the lost nutrients.

Most housewives have heard of the deleterious effects of peeling, soaking, and other methods of preparation on the nutritive value of vegetables and fruits, losses in the preparation of other foods usually being insignificant. The statement that "All the goodness lies in or just under the skin or in the outside leaves of green vegetables" is made very frequently, but results of the work of experienced investigators show that this statement requires considerable modification.

Toast, scones, and baking-powder breads should not be allowed to replace too large a proportion of yeast breads in the diet.

Peeling or Discarding Outside Leaves

It has been shown that the outside leaves of most green vegetables and the peel of root vegetables and fruits do not contain any nutrients not present in the flesh or heart (excepting green outer leaves of cabbage and lettuce, which are much better sources of vitamin A than the colourless hearts) and may even contain less of some nutrients, and that where the peel is a richer source of nutrients than the inside flesh, the flesh usually contains three-quarters or more of the nutrients concerned. Therefore, when practical considerations are against using outside leaves or unpeeled vegetables—for example, when potatoes suspected of being infected with blight must be used—no irreplaceable nutrients are being lost.

Potatoes boiled in their skins have a higher vitamin C content only if the skin remains intact, so preventing the vitamin from leaking out during cooking. When they are cut up, or when the skin has burst, they do not retain significantly more of this vitamin, and presumably of other nutrients, than potatoes peeled before being boiled. Potatoes cooked in other ways with or without being peeled have about the same nutritive value per unit of weight.

Avoidance of Waste

However, most dietitians would advise that in the interests of economy and the preservation of food value there be as little waste as possible in the preparation of vegetables and fruits.

Potatoes and other root vegetables should be scrubbed, cooked, and, if desired, peeled after cookery, and green vegetables and fruits should be used in season and as fresh as possible when there is least possibility of waste. Out-of-season vegetables and fruits, as well as being more expensive, are often less nutritious and more wasteful to prepare than the same foods bought or grown to be ready during the normal period.

Soaking, Grating, and Mincing

At one time preliminary soaking of vegetables was thought to cause a very great loss of the minerals and vitamins, but it has been shown that, unless root vegetables are left soaking for a long time or are cut up finely or shredded, the losses are comparatively small. If necessary, the housewife may peel potatoes in the morning for dinner and leave them soaking in salt water to prevent the surfaces going brown, but green vegetables should be washed and kept fresh in a damp cloth.

Minced, grated, or very finely shredded vegetables should be prepared as close to the cooking or meal time as possible, for enzymes—substances set free when plant cell walls are damaged—destroy the vitamin C, rapidly in green vegetables and slowly but steadily in root vegetables. Grated vegetables used in soups should be cooked immediately in boiling water or stock, for this destroys the enzyme and cooking losses are then comparatively small, though the amounts of vitamins B_1 and C dissolved in the cooking water are considerably greater. Therefore, if the water is to be discarded, vegetables should not be cut too finely; for example, one group of investigators found that 12 per cent. of the vitamin C of runner beans cut in 1in. lengths was dissolved in the cooking water and 36 per cent. was lost from beans sliced finely in a bean slicer.

Effects of Cookery on Nutrients

Many foods are acknowledged to be quite unfit for human consumption in their natural state and therefore must be cooked or processed before being eaten. Whether this habit of cookery has been extended to include many

EFFECTS OF COOKING ON NUTRIENTS . . .

foods which would be better eaten raw has been a subject for controversy, and a great many experiments have been carried out to test the claims of those who favour the use of more uncooked foods, especially after some vitamins were found to be partially lost in cooking processes. Many of those experiments showed the beneficial effect of cookery on the digestibility and absorption of other nutrients, so that a consideration of all the nutrients is necessary in any impartial discussion of the effects of cookery on food.

Proteins

As the main solid constituents of muscles and other body tissues, proteins are essential for health. Consequently the effect of cookery on them is just as important as the effect on vitamins.

Though most proteins are solidified or coagulated by heat (egg white, for example), that does not affect their nutritive value and frequently improves their digestibility (boiled milk and softly boiled eggs are more digestible than the raw foods) unless cooking is carried near to charring point, as in the formation of a brown, crusty layer on roasted meat or crinkled edges on eggs fried at too high a temperature.

It was once thought that meat for roasting should be seared well at a high temperature to keep the juices in and then cooked at a lower temperature, but this method causes more shrinkage and loss of weight and lower digestibility of the seared outer crust than roasting at a constant temperature of 300 to 350 degrees F. The opinion that placing meat to be stewed or boiled in boiling water would seal the surface and retain more mineral salts and extractives in the meat also has been proved wrong, losses being about equal whether the cooking is started in cold or boiling water.

Fats

No changes take place in the nutritive value of fats when they are cooked, whether by deep- or shallow-fat frying or by roasting, unless they are overheated considerably, when an irritating substance, acrolein, is formed. However, fried foods have gained a bad reputation as a cause of indigestion, and their nutritive value also is often regarded as poor, probably because few cooks realise that the temperature of fat for frying is as important as, for example, the oven temperature for cooking sponges and meringues and that the wrong temperature can produce just as disastrous results. Fried foods properly cooked and drained do not contain an undue amount of fat and are readily digested by most people, nor does fried food have a significantly lower nutrient content than the same foods baked, roasted, or grilled.

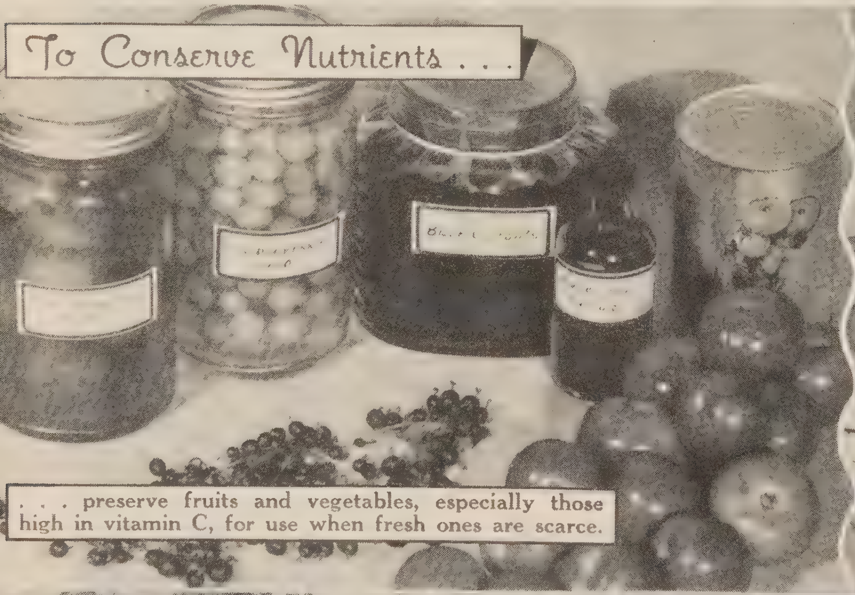
As the temperature in deep fat in a saucepan is much easier to control than that of shallow fat, many authorities recommend using deep fat always, for it is no more extravagant and, apart from the slightly longer time required to heat the fat, it is as quick as using a frying pan.

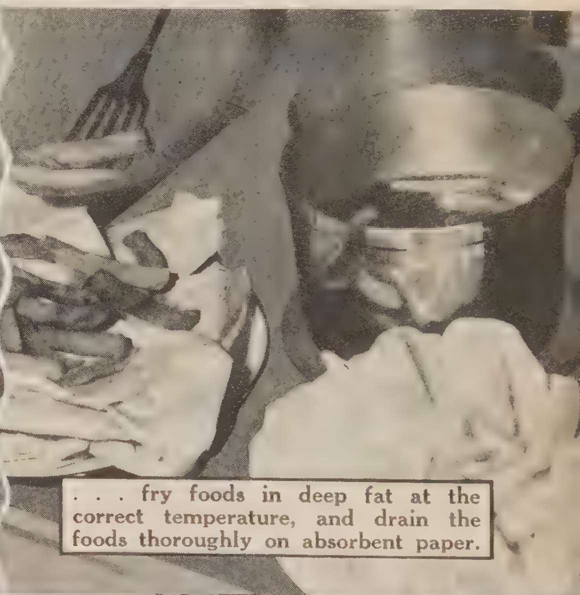
Starches and Carbohydrates

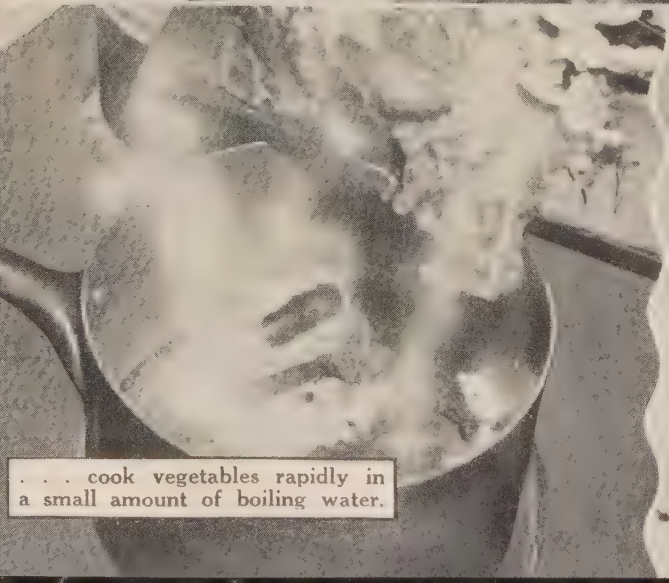
The effect of cookery on starches and carbohydrates in the cell walls of vegetables is altogether favourable. In baked foods some of the raw starch is changed into easily digestible dextrins. The remainder, and the starch in steamed or boiled foods, is changed into the much more easily digested soluble starch.

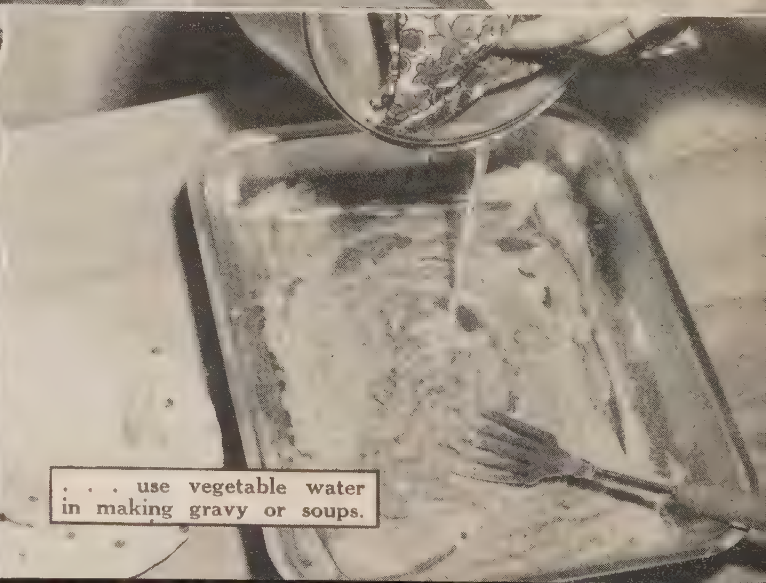
The cell walls of plants are also softened, making their contents available to the body. Some investigators have found that, when carrots are used as a source of vitamin A, smaller amounts of cooked ones than raw ones are needed by animals for satisfactory growth, probably because the vitamin A in cooked carrots is more easily digested and used.

To Conserve Nutrients . . .

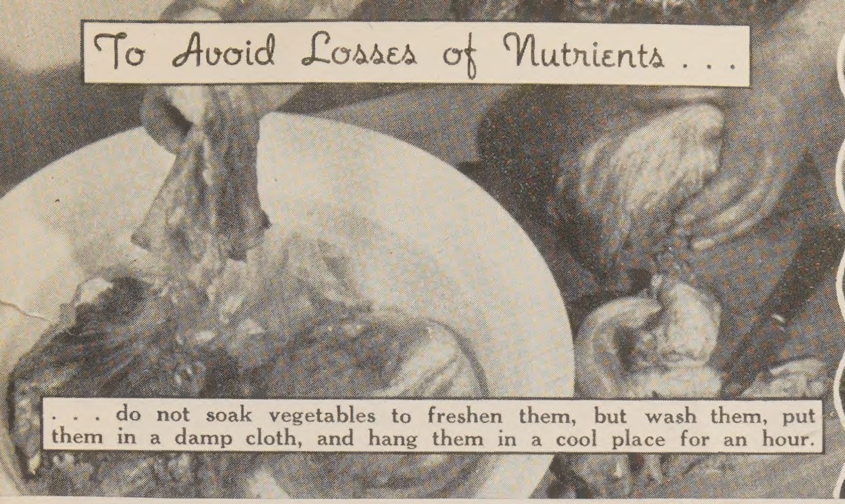

. . . preserve fruits and vegetables, especially those high in vitamin C, for use when fresh ones are scarce.


. . . fry foods in deep fat at the correct temperature, and drain the foods thoroughly on absorbent paper.

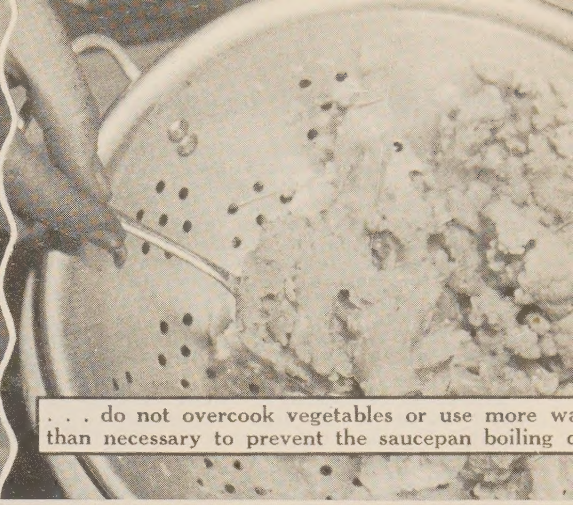

. . . cook vegetables rapidly in a small amount of boiling water.


. . . use vegetable water in making gravy or soups.

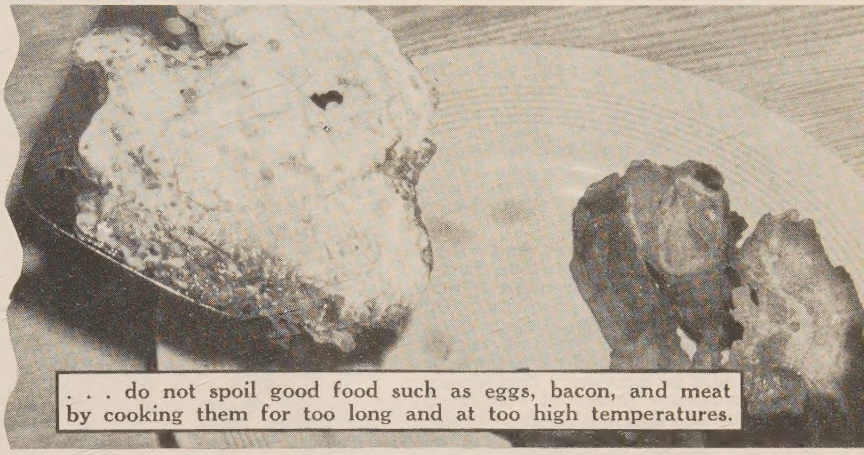
To Avoid Losses of Nutrients . . .



. . . do not soak vegetables to freshen them, but wash them, put them in a damp cloth, and hang them in a cool place for an hour.



. . . do not overcook vegetables or use more wa than necessary to prevent the saucepan boiling c



. . . do not spoil good food such as eggs, bacon, and meat by cooking them for too long and at too high temperatures.

Sugars

Among the most easily digested and absorbed of all food nutrients, sugars probably are also the least affected by cookery. Cooking of acid fruit changes some of the cane sugar into glucose and fructose, or fruit sugar, which require no digestion at all, but as cane sugar itself is very easily digested this improvement normally is not of practical importance.

Minerals

Mineral salts are not destroyed by any of the ordinary cooking processes. In boiling or stewing some of the more soluble ones are dissolved out of the food into the cooking water, but these losses are unimportant compared with losses of vitamins in the same cooking processes (the minerals dissolved out in greatest amounts fortunately are least likely to be lacking in most diets), so methods of cookery which conserve vitamins certainly retain the maximum amount of minerals.

Vitamins

Though they are only one of five groups of essential nutrients, vitamins assume great importance in cookery because they are most likely to be discarded or destroyed in poor cooking practices, especially with vegetables. The losses to guard against are, chiefly, those caused by the solubility of vitamin C and the B group of vitamins in water, those caused by the destruction of these vitamins by heat and the oxygen in air, and those caused by the action of soda and other alkaline substances.

Vegetables and fruits are the only useful sources of vitamin C in the diet and, when cooked to conserve their vitamins, probably provide a quarter of the daily vitamin B_1 requirement, assuming that the amounts recommended for health are eaten. Particular attention to methods of cooking these foods considerably improves the nutritive value of the diet, for poor and careless cookery may destroy vitamin C.

Therefore a method which reduces losses to a minimum, especially in the cookery of green vegetables, has been evolved. In it the following points are emphasised as most important for retaining food value: Garden-fresh vegetables should be used when possible, cut up (but not too finely) so that they will cook quickly, placed in a minimum of boiling salted water without soda, cooked rapidly, and served immediately; the cooking water should be used in soups, gravies, or sauces where practicable. This avoids as far as possible conditions which cause the destruction of vitamins B_1 and C.

Cooking in a minimum of water reduces the amounts of vitamins dissolved in the cooking water. For example, one experiment showed that when green vegetables were boiled covered completely with water, half covered, and a quarter covered the losses of vitamin C into the cooking water were respectively 80, 60, and 40 per cent. Rapid boiling produces a thick blanket of steam which excludes air.

The addition of soda is not advocated because, though it reduces cooking times, it increases the destruction of vitamins B_1 and C. In one experiment cabbage cooked with soda and kept hot for 10 minutes lost about 40 per cent. of its vitamin C, compared with 15 per cent. lost from cabbage cooked without soda during the time after cooking. Because even a 15 per cent. loss is worth avoiding if possible, it is recommended that vegetables be served immediately, especially if they have been mashed, for the loss is then much greater.

In addition, cold cooked vegetables lose vitamin C during storage, one investigator reporting an additional 40 per cent. loss from cooked potatoes stored for 24 hours. Vegetable dishes which make use of twice-cooked vegetables (especially if they have been stored overnight), such as scalloped vegetables, vegetable pies, stuffed baked potatoes, potato scones, and fried cooked vegetables (bubble and squeak), cannot be regarded as good sources of vitamin C, though they may be good sources of calories, minerals, protein, and some other vitamins.

The effect of pressure cookery on the vitamin C value of vegetables has been investigated carefully since this method has become so popular. In no case has it been found to affect the nutritive value more adversely than the recommended method, and in one of the most recent experiments reported, using 10 different vegetables, the results showed that on the average more vitamin C was retained in vegetables cooked in a pressure cooker.

Baking, steaming, and roasting are all satisfactory methods of cooking root vegetables, for though they may destroy slightly more of vitamins B_1 and C than does boiling, there is no loss through solution in the cooking water. Consequently the amounts retained in the cooked root vegetables compare favourably with those in boiled or pressure-cooked root vegetables. However, because exposure to air is an important factor in the cookery of green vegetables, these methods are not satisfactory for them, as a greater surface is exposed to the oxygen in the air, resulting in greater destruction of vitamin C.

COOKING AND PRESERVING FOODS . . .

The acidity of fruits partially protects their vitamins from destruction. In addition, fruit syrup is always used, so that losses of vitamins in fruit cookery are less important than those in vegetable cookery. Some experiments have shown losses in pies and baked fruit tarts to be considerable, however, and it seems probable that in flummeries and other desserts for which fruit is sieved or pulped and mixed with air some of the vitamin C is lost.

The effect of cooking on vitamins in other foods is of less importance because they are not sources of vitamin C. Vitamins A and D are not destroyed readily, except by prolonged heat treatment, nor are they dissolved in cooking water. The vitamins of the B group with the exception of B_1 are also practically unaffected in the cookery of meat, cereals, and other foods.

Because fruit and vegetables are the only useful sources of vitamin C in the diet, the effect of cooking on them has merited special attention. For the same reason, cereals, as the chief sources of vitamin B_1, also deserve prime consideration.

If high-extraction flour and wholemeals are used, they provide half or more of the daily requirement as flour, oatmeal, and similar products. Consequently, if losses in baking bread, scones, or cakes and cooking porridge were considerable, modifications in the menu would be necessary to ensure an adequate human intake of vitamin B_1. Fortunately, experiments have shown the loss of vitamin B_1 in the cookery of bread, porridge, and milk puddings to be small—seldom more than 20 per cent. in yeast bread and 5 per cent. or less in porridge.

On the other hand, baking powder, because it contains baking soda, causes appreciable destruction of vitamin B_1, so that baking-powder breads, scones, and cakes, even when made with wholemeal flour, should not be allowed to replace too large a proportion of yeast breads in the diet. Another advantage of yeast breads is the destruction during fermentation of some phytic acid (a substance present in wheat which makes calcium unavailable to the body), no comparable destruction occurring in baking-powder breads or scones. Toasting bread or scones also causes losses of 12 to 20 per cent. of the vitamin B_1, so the commonly held opinion that toast is more digestible and nutritious than bread requires modification.

In meat cookery losses of vitamin B_1 tend to be fairly uniform whatever the method used—about half. Improvement in palatability and digestibility more than offsets this loss, for there are plenty of alternative sources of this vitamin, and cooked pork still provides a third and cooked bacon a sixth of the daily requirement per serving.

Simple and efficient cookery has no very serious effects on the nutritive value of food.

Some unnecessary destruction of nutrients may be caused in more elaborate recipes for desserts, party savouries, rusks, biscuits, hard-baked toast, and foods cooked for needlessly long times, but when these predominantly energy foods are not allowed to replace the vegetables, milk, eggs, meat, fish, sandwiches, salads, and other constituents of a well-balanced diet they have a useful place in the menu.

Other Methods of Processing Food

Drying, bottling, canning, freezing, and preserving with salt, vinegar, or sugar are other present-day methods of processing foodstuffs.

Dried Foods

Any foods may be dried, and many, especially cereals and legumes, are in fact naturally dried seeds, but the deleterious effect of drying on the flavour of most foods limits their popularity.

On the whole, nutrients are well retained, but vitamin C is destroyed almost completely in commercial or home-dried fruits and vegetables. When they are sulphured to improve the colour some vitamin C is preserved, but at the expense of vitamin B_1. Consequently dried fruits cannot be regarded as substitutes for fresh fruits except for many culinary purposes. They are useful sources of calories or energy, and by adding flavour to desserts they provide a welcome addition to the winter menu.

The nutritive value of dried milk and eggs when they are reconstituted is comparable with that of the fresh foods, for, apart from a slight loss of vitamin B_1, their nutrients are well retained. Indeed, dried milk may be of greater value than fresh milk for infant feeding as it forms much finer and softer curds in the stomach and therefore is more digestible.

Frozen Foods

As a method of food preservation freezing has probably the greatest possibilities of expansion, for, provided it is carried out properly, it preserves food with a flavour more closely approximating that of the fresh food than any other method yet developed. As a means of transporting meat, butter, and other perishable foods refrigeration has been of vital importance to New Zealand's economy, and the high quality of such foods is acknowledged widely. Their nutritive value, too, is usually indistinguishable from that of the fresh food.

Frozen fruits and vegetables are comparative novelties to many New Zealanders, though if the American lead is followed, many more people are likely to obtain home freezers and the variety and quantity of frozen foods on the market will increase steadily. Consequently, such foods may become important factors influencing the nutritive value of diets, though their present cost is such that they are luxury foods. Their nutritive value has yet to be investigated thoroughly, but from preliminary reports it seems possible that, like foods preserved in other ways, they lose some vitamins during preparation and storage. For that reason their vitamin C content usually is slightly inferior to that of high-quality, freshly cooked vegetables, though they are equally good sources of other nutrients.

For maximum retention of vitamin C frozen vegetables should be defrosted and cooked immediately, for losses of this vitamin occur rapidly after thawing; thawed peas, for example, have been found to lose 27 per cent. of their vitamin C in an hour. Vitamin C may also be lost during the storage of frozen vegetables if they have not been blanched before being frozen and if the storage temperature is allowed to rise above zero F., losses of up to 90 per cent. having been reported. Therefore great care is necessary in their preparation, storage, and cookery if their nutritive value is to be comparable to that of freshly cooked food.

Canned and Bottled Foods

One of the best methods for the preservation of foodstuffs is still canning or bottling. The carbohydrate, fat, and protein content of such foods compares favourably with that of the freshly cooked foods, and the palatability of most canned foods now on the market is good. In fact, many people prefer tinned pineapple, peaches, and apricots to the fresh fruit. A comparison of their retention of vitamins B_1 and C with that of the freshly cooked food provides a sufficient estimate of their nutritive value.

The greatest loss of vitamin B_1 occurs in the canning of meat and fish, because of their low degree of acidity and the long cooking times required for complete sterilisation. Usually their vitamin B_1 content is considerably less than that of the freshly cooked meat, and because of the methods used in preparation the niacin and riboflavin content of canned corned beef in particular is comparatively low. Losses of vitamin B_1 in the canning of vegetables do not differ greatly from those in ordinary cooking processes.

The vitamin C value of canned vegetables and fruits generally compares favourably with that of the freshly cooked food, provided the syrup or vegetable liquor is not discarded. In fact, when high-quality fresh vegetables and fruits are not obtainable, canned products prepared from freshly picked, high-quality foods may have a better vitamin C content than those available.

As a general rule, therefore, canned vegetables and fruits may be substituted for freshly cooked ones when desired. Bottled fruits of high vitamin C value, such as orange juice, rose-hip syrup, black currants, and gooseberries, are also excellent sources of this vitamin when fresh fruit is expensive or scarce.

Other Methods of Preserving

Salted foods, pickles, and jams are of value chiefly as supplementary energy foods in the diet. They also provide a welcome change when used as flavouring agents in dishes or for other purposes, but should not be regarded as regular substitutes for fresh foods or fruits.

Though the nutritive value of foods may be decreased by cookery and other forms of processing, if the approximate amount of destruction which may occur is known, the disadvantages can easily be obviated.

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